AMATEUR TELEVISION QUARTERLY

VOLUME 7 #2
SPRING 1994
APRIL-MAY-JUNE
ISSN 1041-198x
USPS 003-353

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13 CM BAND THREATENED
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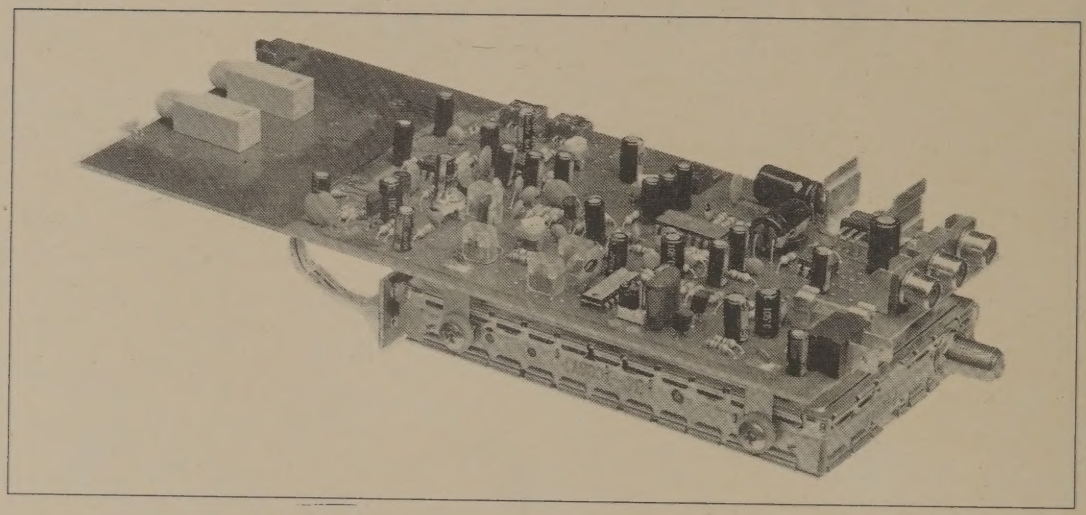

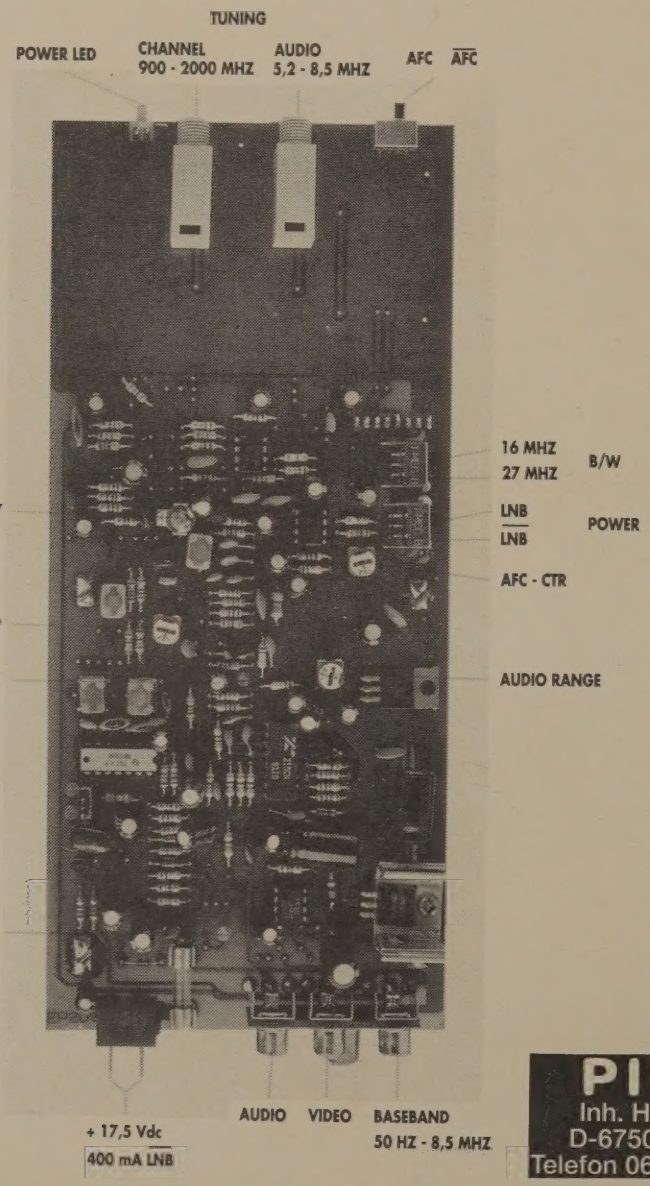

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DAYTON 94

BOOTH 053!

FRIDAY NIGHT ATV PARTY

We sent in our reservation for the Holiday Inn friday night ATV party. Same place, same time as always. Bob Rau of Ypsilanti is putting the program together this year and the speakers should be better than ever. For new readers, the Holiday Inn North, I-75 at Wagoner Road (across I-75 from Denny's & Best Western) 7 PM to midnight. Always a night to remember!

Bill WB8ELK wondered around after leaving 73 Magazine and is now with NASA in Hunstville, AL. Bill says he will be at Dayton.

MINI SWAP AT ATV PARTY!

Bring your goodies for an ATV only swap at the Friday night ATVQ party. (no outrageous booth fees or flea market parking fees). **No computers, toys, rag dolls, WWII junk--only ATV equipment (video or RF)**: transmitters, receivers, tape machines, cameras, monitors, amplifiers, filters, and other ATV gear! Stake out a table at the party and have fun. Overflow into the parking lot for trunk sales! First come first served, no table reservations.

Room opens at 6 PM.

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NEXT ISSUE DEADLINE JUNE 15, MAILED JULY

QUEST CONTESTS

DATES, 1994

FSTV SPRINTS: AND CUMULATIVE CONTESTS

TIME: From 6 PM Friday Local to midnight Sunday night/Monday morning. Cross time zone contacts are allowed to extend 1 hour before or after as applicable. Any 36 hour operating period within the time window. May be any number of segments 4 hours or longer to total not more than 36 hours.
CATAGORIES: Total ATV Contacts, Total Quest Contacts, Best DX

SSTV SPRINTS AND CUMULATIVE CONTESTS

TIME: from 1200 GMT Friday to 1800 GMT Sunday. Any 24 hour operating period within the time window of each contest. Period may be any broken into a number of segments 4 hours or longer each to total not more than 24 hours.
CATAGORIES: Total SSTV or FAX contacts, Total Quest Contacts, Best DX.

PRIZES: Each winner receives their choice of any ATV book from the ATVQ catalog, or subscription renewal for one year to their choice of ATVQ, CQ-TV or VHF Communications.

EACH CONTEST PERIOD IS A SEPARATE CONTEST:
ANY 5+ MAY BE USED FOR CUMULATIVE CONTEST

DATES : MARCH 18-20, APRIL 8-11, JUNE 10-12, JUNE 24-26,
AUGUST 12-14, SEPT 16-18, SEPT 23-25 NOV 11-13

SUBSTITUTIONS: One weekend period of any date may be substituted for any of the contest dates provided it coincides with Field Day, any CQ or QST contest weekend (state dates and contest). Operating hours will remain unchanged from those in the contests.

RULES: FSTV may be AM or FM video. SSTV may be any SSTV or FAX picture mode.
A contact shall consist of the two way exchange of video including call letters of both stations in QSO. A Quest contact shall consist of two way exchange of video including call letters and Quest number. Each contact shall be 1 point per band. A contact with one station on each of five bands is thus 5 points. DX shall be by shortest path between stations, calculated for great circle distance. Latitude and longitude maybe rounded to nearest degree for SSTV and nearest mile for FSTV using any common map. In event of a tie, winner will be selected by random drawing. Cumulative contest (year long) entries are determined by cumulative totals for all contests periods with a minimum of 5 periods in which the entrant has participated.

I MADE A DEAL WITH OL' FRED THAT WHOEVER WENT FIRST WOULD TRY TO SET UP A SKED WITH THE OTHER, BUT HE'S PROBABLY POINTING HIS BEAM STRAIGHT DOWN !!

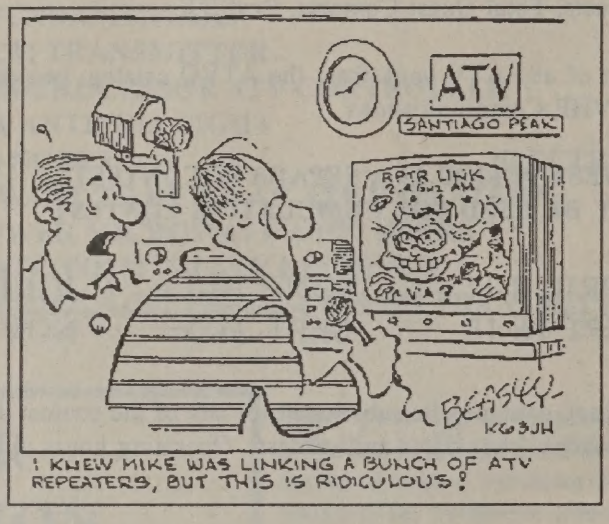
LOGS: Logs should contain the following information: Call, date time band. Hours of station operation, operator name call, address, Quest Number.Individual contest logs may be submitted within 14 days of each contest period. After that time the entry is void. Their must reach ATVQ within 21 days of each contest. Winners will be announced in the next following issue of ATVQ and in format also released to other ham publications. Send logs to: QUEST CONTEST, ATVQ, 1545 Lee St., Des Plaines, IL 60018. The decision of the judge, Tom W9NBG, shall be final. Prizes will be mailed immediately after winner has been determined. Any taxes are the responsibility~ the winner. Void where prohibited by law. Good Luck!

LOOKING FOR VIEWS IN ALL THE RIGHT PLACES

CALIFORNIA

A new ATV organization, Central Valley Amateur Television, has a new newsletter, edited by Mary Stone AB6VI. They are looking for ATV'ers in the central valley of California (Stockton) area to join in their fun. The group QSO's via the Mt. Diablo repeater and a new repeater is being built on Mt. Osolis. When built, it will link to the southern California ATN system. Two meter net is on Thursday 8 PM on 147.06+. Contact Mary at 2915 W Princeton Ave, Stockton, CA 95204 or 209 467 1503.

ATN has a new 2.4 GHz input on Santiago peak on 2441.5 MHz. (had a typo last issue, sorry) ATN is also looking for a new membership certificate design. Contact Mike WA6SVT. Jim KC6TFV has planned a 2.4 to 3.4 GHz translator for Sierra peak. Sierra peak will be an alternate for users of Santiago peak. The Mt. Oat repeater, three miles from ground zero of the latest earthquake is now 15 inches higher! The building was demolished but Bob W6LUY has taken over for maintenance of the site. The link receiver to Santiago is complete and dish antennas are mounted at both ends of the path. Santa Barbara is still operational. Improvements have been made to Mt. Brekenridge with a new double conversion receiver and a 919.25 MHz receive antenna for the output from Blue Ridge. Loop Canyon has also had antenna improvements. Las Vegas enjoys increased usage. A popular equipment choice is a "Video path" transmitter (FM video transmitter similar to the Rabbit) with a 16 watt M-67769 brick amp. If you use the Mitsubishi amp, the grounding is critical to avoid oscillation. The KB7BY repeater no uses a Macom CATV converter and Downeast Microwave up converter. Lastly the 1.2 GHz link to Blue Ridge has been operational with excellent pictures.



COLORADO

Perhaps prompted by ATVQ's lack of the slashed zero, perhaps not, either way, the Society of the Preservation and Encouragement of Differentiation Between Numeral Zero and Letter O (a sub group of the Rocky Mountain ATV'ers, has formed to save the slashed zero ([Ø] v 0). and offers a membership certificate by non Zero Steve WB7VHR. (We guess he is an honorary president, being a non Zero) and for fun KB9FO has been selected as a half member for having an O. This seems to have started after correspondence about our desk publishing system not being able to transfer the zeroslash from Word Perfect to Pagemaker intact. (Its also a lot of extra key strokes to make a slashzero). Their hamfest will be May 21st at Liberty High School, Colorado Springs. Contact Harv Hunter WA3EIB 719 597 8964. Visit the Nikola Telsa museum at 2220 E Bijou while you are there!

KENTUCKY

Looking for a friendly club? Lincoln Trail ARC with over 100 members based in Elizabethtown, KY, is looking for members. Their annual hamfest (March 5th this year) has been a good place to find the golden goodies and their newsletter is typically 12 pages of good information. Contact LTARC, PO Box 342, Vine Grove, KY 40175.

ILLINOIS

Chicago heats up, after a cold snowy winter with lots of ice! The PATC repeater changed exciters and would up with a high level of TX IM. Consequently, the repeater went to dual antennas until a new ICM FL407 filter could be added. The new ICM filter was added directly at the exciter output and the system is now back on the omni-horizontal 10 dB gain Lindsay antennas. So far over 20 stations have checked in with reports of P2 (far south side of Chicago) P4 Downers Grove-Naperville, P4 Lake Zurich, P5 Addison, Inverness, P4 Elgin. The system works 439.25 Lower VSB in and 421.25 UPPER VSB out with 40 watts TX output.

Designed specifically for amateur television in the 70cm band...

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Heavy duty construction insures stable operation and long life.

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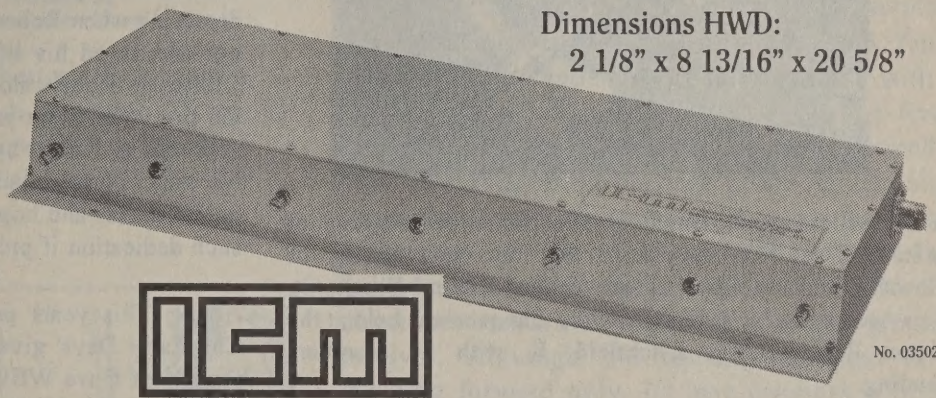
Dimensions HWD:
2 1/8" x 8 13/16" x 20 5/8"



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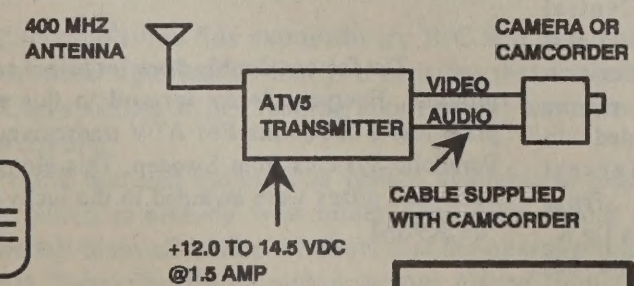
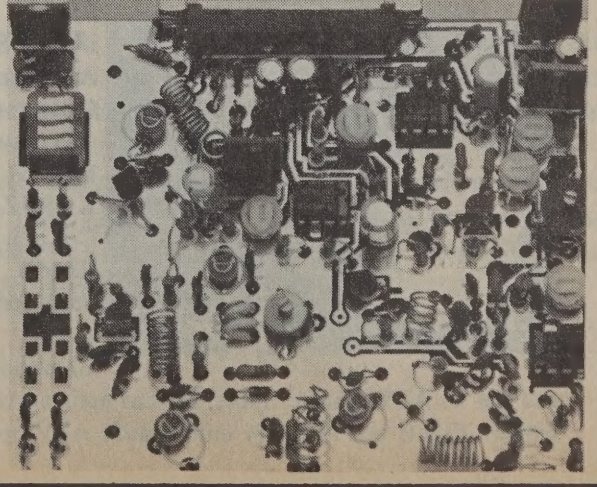
THIS IS THE MORE POWERFUL TRANSMITTER THAT RIVALS THE COMPETITION. IT HAS SUCCESSFULLY BEEN USED IN REPEATERS AND ATV TELEVISION STATIONS ACROSS THE COUNTRY. IT IS AN ALL IN ONE BOARD WITH SOUND FOR THE AMATEUR THAT WANTS TO PACKAGE AND MAKE HIS OWN FIXED OR PORTABLE ATV TRANSMITTER. THIS BOARD IS WIRED AND TESTED PRIOR TO DELIVERY. THE ATV5 PROVIDES AT LEAST 6 Db (ONE P UNIT) MORE POWER THAN THE ONE WATTERS. NO NEED FOR A POWER AMPLIFIER SINCE IT IS ALREADY ON THE BOARD. SAVES HUNDREDS OF $. ORDER THE ATVPLL4.5 AND HAVE CRYSTAL CONTROLLED 4.5 MHZ SUBCARRIER AUDIO (NEW PRODUCT).

EASY TO USE. JUST MOUNT IN A BOX. CONNECT AN ANTENNA, +12 TO +13.8 VDC, CAMCORDER CABLE VIDEO AND AUDIO, AND YOUR ON TV WITH PICTURE AND SOUND.





ATV5 - $229.00
PLL4.5 - $49.00

CALLS ACCEPTED AFTER 6PM PHOENIX TIME. SPECIFY FREQ'S 426.25,427.25,434.00, AND 439.00. ONE FREQ INCLUDED. EXTRA FREQ/S $16.00 EACH. INCLUDE $5.50 FOR SHIPPING AND HANDLING. AZ RESIDENTS ADD 6.7% SALES TAX. CHECK OR MONEY ORDER.

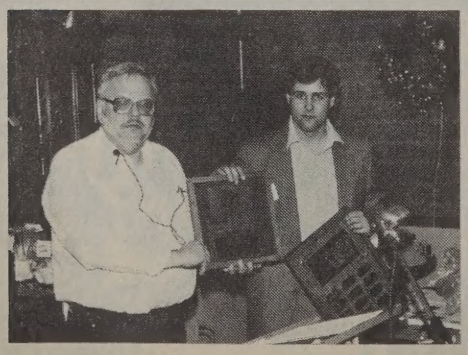
1993 SEVENTH ANNUAL ATV BANQUET LITCHFIELD, ILLINOIS

On a cold and snowy night in late November a group of Amateur Television Operators met for an evening of fellowship and fun. The Seventh Annual Central Illinois/St. Louis Area Amateur Television Club Banquet was held at the Ariston Restaurant in Litchfield, Il. with 64 members attending.

The activities began at 5 P.M. with old and new members making and renewing acquaintances during happy hour. With special Christmas decorations added by Kathy WB9QLY and niece Amy Bishop holiday fellowship was in full gear.

At 6:30 P.M. K9SM called the banquet to order beginning with a prayer by Cindy N9GNZ. Following the prayer the clatter of utensils and plates and chatter from the various tables were heard and a delicious meal was enjoyed by all

The program for the evening began with a new award. Harold KD9SG, Reba N9END, and Mark WA9SXK were inducted into the Order of the Odor by K9SM. This was due to their tireless efforts in helping televise the Old Settlers Parade at the control point during the heat of August in Hillsboro. In addition to the special certificate, each were given a deodorant stick for future use.

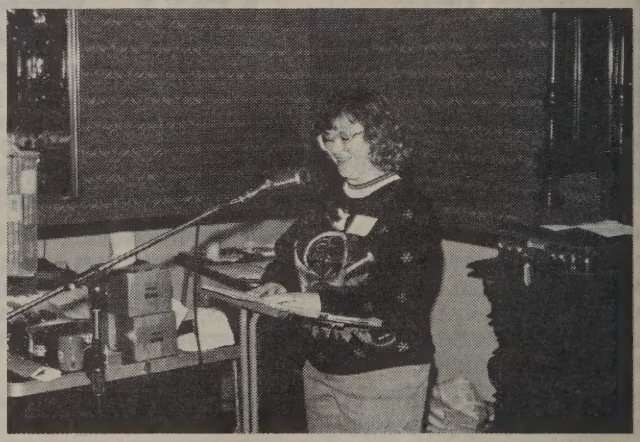


The third annual Central Illinois/St. Louis Amateur Television Operator plaque was awarded to Mark Garrett KA9SZX from Champaign, Illinois. Mark has been very active in ATV in the Champaign area and has an ATV repeater there. He has assisted with several balloon flights and is a very enthusiastic ATV operator.

A special presentation was made to seven year old Robert Spaeth, son of John KDØLO from St. Louis, Mo.

Robert was on vacation in Massachusetts when he and his cousin were playing on a pier at Lake Pautaukaway. His cousin fell in the water and was drowning when Robert dove in the water and pulled him out and saved his life. A letter was sent by President Clinton to Robert along with an autographed picture of the president to be presented at the banquet. The letter was read to Robert by Ben K9IDQ of the Illinois News Network congratulating Robert on his bravery and unselfishness and hoped more young people would have such dedication if presented with a similar situation.

This years program was a presentation 'ATV, The Early Days' given by Shelley KBØFCM. Shelly is the xyl of Dave WBØZJP who is an early ATV pioneer in the St. Louis area. She told of Dave's first ATV contact and his excitement and his ATV antics. She also spoke about the fellowship from the group and gave us a woman's insight of amateur television.



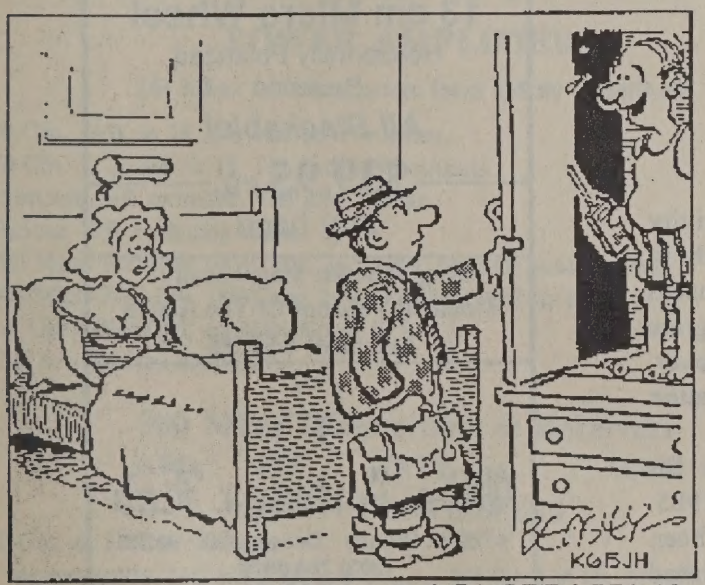
The famous double draw for prizes concluded the program. Everyone looks forward to this as the grand prize was a 1200 Mhz FM ATV transceiver donated by Parabolic Systems from Sweden. This along with many other fine prizes were awarded to the lucky winner.

de K9SM

NEW HAMPSHIRE

Another new ATV club! ATOM, Amateur Television of Manchester. Its newsletter editor is Bill WB1ADF. The group sponsors an ATV repeater in Derry. Recent tests by Ron WB4HFN, Rich NM1D Dick W1KGZ and Bill to find a better site located a spot on Mt. Uncanoonuc which covered Derry, Manchester and Hampton. Local voice coordination is on 146.745 repeater. Contact the club at 175 Crosbie St., Manchester, NH 03104

AMATEUR TELEVISION OF MANCHESTER
ATOM
175 Crosbie St.
Manchester, NH 03104



BINGO---YOU JUST FOUND THE HIDDEN TRANS-MITTER!

ATV RC

Anyone who needs proof ATV'ers are a creative group need only take a look at the project that Carl Berry K6MWN of Abilene, TX, has recently completed. In addition to being an R/C flier, Carl is also a radio ham and an amateur video enthusiast. About three years ago, Carl decided to combine these interests in a single package. The result is this home-built RPV (remotely piloted vehicle) that he successfully demonstrated at the Southwest Fan Fly and at the ATVQ friday night ATV Party. The airplane has a 10-foot span and a scratch-built RFB fantrainer powered by a Zenoah G-62 and equipped with an on board starting system. The fan consists of five Zing EM 12x12 prop blades attached to a machined metal hub. This propulsion package produces 22 pounds of static thrust at 9,100rpm, which provides more than adequate power for the 31-pound model. The "eye" of the system is a Sony color camera coupled to an ATV down link transmitter that sends video to a ground-base receiver. Although the camera's position is fixed, shooting forward only, its lens provides a 60 degree field of view, which is enough to provide excellent visual cues for orientation.

For the "cockpit" or ground based portion, Carl started with a Futaba 7UHF system, a narrow-band FM video receiver, a 19-inch color monitor and a surplus SEGA Turbo video-game enclosure. Blending all these components together, stirring gently and brewing over a period of two years, Carl now has what has to be one of the neatest accomplishments to come down the R/C pike in quite some time. Carl sits In the "cockpit" and is hooked up via intercom and the equivalent of a trainer cord to a backup pilot who is positioned outside and maintains direct visual contact with the fantrainer, and who can assume immediate control should any difficulties be encountered.

Having accomplished this extraordinary R/C feat is a real tribute to Carl's resourcefulness and ingenuity, but it becomes even more significant when you consider that the entire project cost around $3,500! For those interested in duplicating Carl's efforts or just reading about how it was done, a two-volume set of "How-To" books is being prepared by Supercircuits.

You'd think that just having this system available to play with would be enough to satisfy Carl--not so! His next objective, which is already well under way, is to shrink all the video components presently located in the "cockpit" and install them all within a helmet that the operator will wear! Think about it, and imagine the possibilities: air-to-air combat, formation flying, pylon racing! *Edited from Model Airplane News*

Additional information: ATVQ Vol 2 #4 and V3 #3

900 MHZ

from W5YI REPORT

The American Radio Relay League has filed a *Petition for Rule Making* with the FCC asking that the Amateur Service be granted primary status in the 902904 and 912-918 portions of the 902-928 MHz band. ARRL General Manager David Sumner, K1ZZ, called 902-928 MHz -- a band with many uses -- the "KitchenSink Band" in a QST editorial last June. ARRL wants amateurs to have primary status because new developments in the band could make ham usage more difficult there, and a primary allocation would help preserve amateur operations, and because the FCC has previously stated that amateurs should use 902-928 MHz to serve needs that formerly used 220-222 MHz.

The 902-928 MHz ARRL bandplan shows the following:

- 902.0-903.0 Weak signal (902.1 calling frequency)
- 903.0-906.0 Digital (903.1 alternate calling freq.)
- 906.0-909.0 FM repeater outputs
- 909.0-915.0 Amateur TV [ATV]
- 915.0-918.0 Digital
- 918.0-921.0 FM repeater inputs
- 921.0-927.0 ATV 927.0-928.0 FM simplex and links

The band has not yet become a hub of major activity as have other ham band . Still, the tremendous growth in amateur Radio in this country -- over 650,000 licensees currently -- begs the question of where amateurs will migrate to as the VHF and UHF bands become saturated. Moreover, ARRL finds that 902 activity is increasing. The organization began its FCC request with these words:

"The 902-928 MHz band has been available for amateur radio use generally in the United States since 1985. With a few geographical limitations, the entire band has been available for use, and has been used increasingly, by United States amateurs since then, especially at 902-904 MHz and at 912-918 MHz. The band was allocated on a secondary basis for amateur use in PR Docket 84-960...."

"Since that time, the segment 902-904 MHz and the segment 912-918 MHz have each been used significantly for amateur weak-signal propagation experimentation and television operation, respectively. These amateur uses in particular have become firmly established in those respective band segments, and the amateurs active in those band segments especially have come to depend on them for regular communications using these specialized communications modes. Indeed, restrictions on, or difficulties with television operation in other bands, have made the continued use of the band increasingly important for amateur operation."

WHEEL ANTENNAS!

70 cm Little Wheel
420-450 Mhz: ATV or 432.1 SSB

900 Mhz Nano Wheel
ATV

23 cm Mini Wheel
ATV

13 cm Micro Wheel
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All Stackable!

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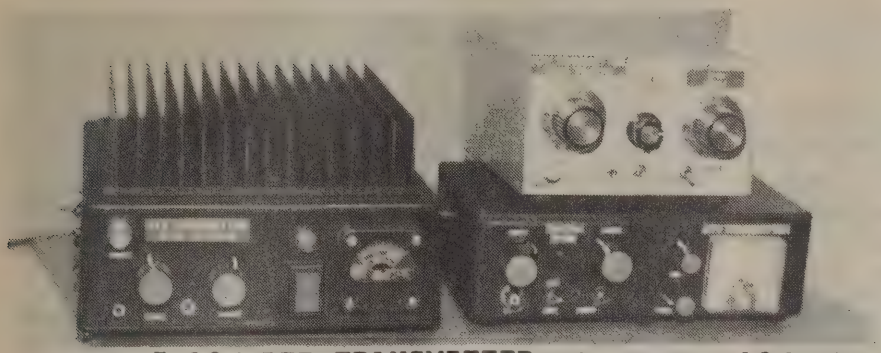
"The differences between and among the various VHF and UHF amateur allocations necessitate a small weak-signal subband in each band for propagation research. The rapid increases in amateur use of 902-928 MHz for these purposes, coupled with current, apparently unplanned allocation proposals which would significantly detract from the ability of amateurs to continue to utilize 902-904 MHz and 912-918 MHz on a secondary basis, together necessitate a primary allocation for the Amateur Service in at least these two segments of the band."

pauldon ASSOCIATES

BOOTH 319

210 Utica Street Tonawanda, NY 14150 (716) 692-5451



PD-ATV-5 10W PEP TRANSMITTER PD-ATV-4 10W PEP TRANSCEIVER
PD-ATV-50W PEP TRANSMITTER

70 CM ATV Amateur Television System

PD-ATV-5 $293 PD-ATV-50 $530 PD-ATV-4 $379

POWER AMPLIFIERS

144 Mhz.- 1.2 Ghz., prices from $89.00 to $459.00

70 Cm. ½W in 18, 35, and 65W outputs.
70 Cm. 1, 2, 3W in 18, 35, and 65W outputs.
Most are T/R switched. FM and Linear.
Various T/R switching times.
900 Mhz. 1MW in 2-3W, 8W, and 20W. Outputs AM or FM.
900 Mhz. 1W=6W, 18W, and 24W. Outputs AM or FM.
1.2 Ghz. 1W=18W, or 36W. Some T/R.
Call or write for catalogue.

900 Mhz. Transmitters & Receivers

AM FM TYPE * ATV

DOWN CONVERTERS

70 Cm. & 33 Cm. Tunable.
3 cabinet styles, including diecast ..... $65.00, $68.00, $78.00 and $88.00
MOST OF OUR PRODUCTS ARE IN DIECAST ENCLOSURES.
The majority of our power amplifiers are in 4.5"x 7.5" enclosures.
P. A. have full heat sinks (custom), some heavy duty or extra large.
1.2 Ghz. equipment such as down converters.
Receivers and transmitters soon.

PAULDON ATV VIDEO SAMPLER (Model PD-VD-1)

This unit picks up your transmitted ATV signal by sampling the transmission line with negligible insertion loss. It uses 2 "N" connectors for input and output connections. A BNC is used on the video output. The detected output is connected to your monitor and scope so that you may accurately adjust your transmitter for proper video and sync levels. We provide two different models. Both have relative power output meters, but one has a greater accuracy. There are 2 PC controls, one for video level and the other for power output. This beats an on-the-air adjustment.

PD-VD-1, Line sampler with Surplus Meter ..... $ 72.00
PD-VD-1N, Sampler with new Meter 77.00
PD-VD-1A, Line Sampler with 2 outputs. (1) Video and (1) R.F. for CH#3-4 or ant TV set 89.00

Model: PD-900N-3
(Mast Mounted Transmitter)

900 MHz Amateur Television System

Specifications:

ELECTRICAL

TRANSMITTER

Frequency: 918 MHz
Modulation: FM
Deviation: 4 MHz
Power Output: 1 - 2 Watt
Output Impedance: 50 ohm
Input Voltage: 13.8 VDC
Input Power: 1.0 A
Frequency Stability: +/- .01%
Video Input: 1.0 volts P-P (75 ohm). NTSC Compatible. standard broadcast color or black & white
Audio Subcarrier: 4.5 MHz
Audio Bandwidth: 100 Hz - 6 KHz
Audio Input Impedance: 600 Ohm

RECEIVER

Frequency: 918 MHz
Input Voltage: 11-16 VDC
Input Power: 400 mA @ 15 VDC
Frequency Stability: +/- .01%
Threshold: -72 dBm
Input Impedance: 50 ohm
Output: Channel 3 or 4 RF

Transmitter & Receiver
1-2W $249.00

Preamplifiers

Tower mounted diecast 125W capacity.
Designed for Packet-FM-SSB-ATV

100 misecs. and 1½sec. switching.
Magnacraft relays and diode protection.
SINGLE GATE GaAs Fet. transistor.
NF 0.6db. G 16db.
PD-440TR-L (420-450 Mhz.)...$123.00
Same . Isolator 135.00

TOWER MOUNTED DIECAST

75W Capacity.
Fast switching.
Special switching and diode protection.
SINGLE GATE GaAs Fet. transistor.
NF 0.6db. G 13-17db.
TPD-900-TR-L (900 Mhz.).....179.00
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NON SWITCHING TYPES

PD-440S (70 Cm.)
420-450 Mhz.....$56.00
Diecast
TPD-900 (900 Mhz.)..... 82.00
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Diecast
Your choice of connectors.
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WARRANTY 2 YEARS ON POWER AMPS
EXCEPT THE SOLID STATE PARTS
6 MONTHS. PREAMPLIFIERS 1 YR.
EXCLUDING THE GaAs FET .

200 MHz of Spectra to be Reallocated

Ham Radio Affected

FROM WESTLINK REPORT

IMMENENT LOSS OF 13 CM BAND!

Amateur radio may lose part of one super high frequency band (SHF) in the wake of the release of a Commerce Department report that recommends moving the military and other government agencies off much of the nation's airwaves to make way for new commercial use of the frequencies. The portions under fire are 2390-2400 MHz and 2402-2417 MHz. If they are reallocated to commercial interests, their loss will have an impact on several important ham radio projects, including high speed packet radio data relays, EME and other weak signal experimentation.

The peril to this frequency segment became known on the 11th of February. In a preliminary report, the Commerce Department announced that it had targeted 200 MHz of prime VHF and UHF radio spectra to be redistributed immediately. It also indicated that an even bigger block would be made available over the next 15 years that could include the amateur radio allocation running from 2300 to 2310 MHz.

This reallocation proposal is part of a major push by Congress, the Clinton administration and the National Telecommunications and Information Agency (NTIA). The plan is to reassign valuable government spectrum to the business sector to expand all sorts of communications concepts. It also follows an earlier decision to reallocate another big band of spectrum to the next generation of wireless technology, known as personal communications services.

The Federal Communications Commission will auction rather than simply grant licenses for the right to use those frequencies. The bidding will begin this spring and is expected to generate billions of dollars that will go toward paying off the national debt.

The Los *Angeles Times* reports that many companies are already jockeying to invade that market, touting their plans to build networks that would allow consumers to carry lightweight phones at prices far more affordable than current cellular phone service. Contenders in the emerging market run the gamut from existing cellular phone companies to cable companies and publishing concerns.

The Commerce Department report did designate certain specific spectra to be shared by government and private sector users. It said that moving some government services will be delayed until new equipment can be built. As a result, some of the reallocated bands will not be made available for several years.

The study also concluded that moving some services would be inappropriate, partly because of extensive investments made by the government or the services provided by the current spectrum users. It recommended that certain navigational services, meteorology, astronomy and space communications services should not be moved. This has given protection to the Amateur Satellite band running from 2400 to 2402 MHz and means that plans for the Phase III-D and other future hamsats can go forward without redesign of the bird.

A final report on this proposed spectrum reallocation is scheduled for release after the FCC and the public and private sectors have a chance to comment on the proposals. Completion of that research and release of the report should come in about twelve months.

Tnx News line.

WHAT CAN YOU DO?

ATVQ has received several calls from readers and ARRL directors asking that there be a "call to arms" to protect the 13 cm band. 13 CM has just begun to emerge as the next great frontier for popular activity. ATV already uses it for repeaters and links. Inexpensive solid state equipment has just come onto the surplus market and at least 2 manufacturers have just this year started to market 13 cm ATV gear (FM mode). Weak signal/dx and just plain vanilla SSB activity occupies this band, especially during band openings and contests. There are two beacons locally in the Chicago area and when the band opens, contacts of several hundred miles are common.

MMIC's single component signal sources, such as the Z-Com SMV-2500 (data in this issue!) Plessy direct frequency synthesis chips and low cost GasFETS that work in this band have finally come into the range of the average ham tinkerer.

There are ATV repeaters using this band in 8 states and several areas report simplex activity or links on the band. The Europeans have long occupied 13 cm due to their lack of 70 cm band space for repeaters. A situation already experienced in southern California, San Jose, and other areas. In some areas 900 has been clobbered by Vehicle Locating systems, and 1240-1305 has interference from Radar in some areas. The Wind profiler on 449 MHz added to the A line loss of 420-430 and encroachment from packet users pushed out of 220-222 MHz crowds an already crowded 420-450 MHz band. Sooner or later some of these users must move up to 23 cm or 13 cm, or higher.

13 CM LOSS

WHAT TO DO NOW!

Send ATVQ and ARRL information on the local activity on 13 cm. Don't forget to contact local DX'ers, weak signal ops in your area. This is for more than just ATV. Send a letter and CONSTRUCTIVE comments and FACTS (not just opinions) to NTIA: Mr. Norbert Shroeder, Program Manager Spectrum Operations, Room 4092, US Department of Commerce, 14th and Constitution NW, Washington, DC 20230.NTIA can also be reached via FAX: 202 482 4396, or INTERNET-TELNET: NTIA BBS.NTIA.DOC.GOV

Your letters should detail local useage, activity, future expansions expected. Explain why the band is important to you and ham radio. List any local repeaters, NETs or other regular operation. Talk around on the local repeaters to find other activity you may not know about!

There will be two public hearings. The first, at 1:30 PM, room 4830, Herbert Hoover Building, 14th and Constitution, Washington, DC 20230. The second hearing requires you write by May first to appoint a representative (it could be yourself) for the hearing on June 24, at 9:30 AM, same place. The second meeting is for current and potential users.

Since ham radio is a secondary service or shared service on nearly all VHF-UHF-SHF bands, any loss of military frequencies impacts ham radio. Thus this is probably only the first assault of many on our microwave bands. As we have frequently said, USE IT OR LOSE IT! Send your letters NOW. If someone will donate plane tickets (ORD-DCA) I will go to the public hearings. de KB9FO

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The New England A. R. R. L. Convention at Boxboro Massachusetts

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Read this list.....*they* know where the action is!

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CQ Magazine
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Mycal Chicken Software
NCG Antennas
N. E. Technology
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PacComm
Palomar Engineering
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PDK LogView Software
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Public Domain Software
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Rainbow Magazine
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R. F. Parts Company
Rotator Enhancers
Science Workshop
Sensible Solutions Software
Sentec Instruments
SeaTek Computers
73 Magazine
Smiley Antennas
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Standard Radio
Ten-Tec Incorporated
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Our committee has been producing winning ham conventions since 1959. We mail over 25,000 flyers to every past attendee, to ARRL members in New England and the Hudson division of New York State.

In addition we mail to all newly licensed hams - those anxious to buy new equipment. And to top it all off we run full page color ads with a bind-in coupon insert in CQ Magazine and often in 73 Magazine to reach all those hams and prospective hams missed by the mailings! *We do our job well.* Join us!

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☐ F. CABLE FACILITY/NETWORK
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☐ H. MEDICAL FACILITY
☐ I. GOVERNMENT FACILITY
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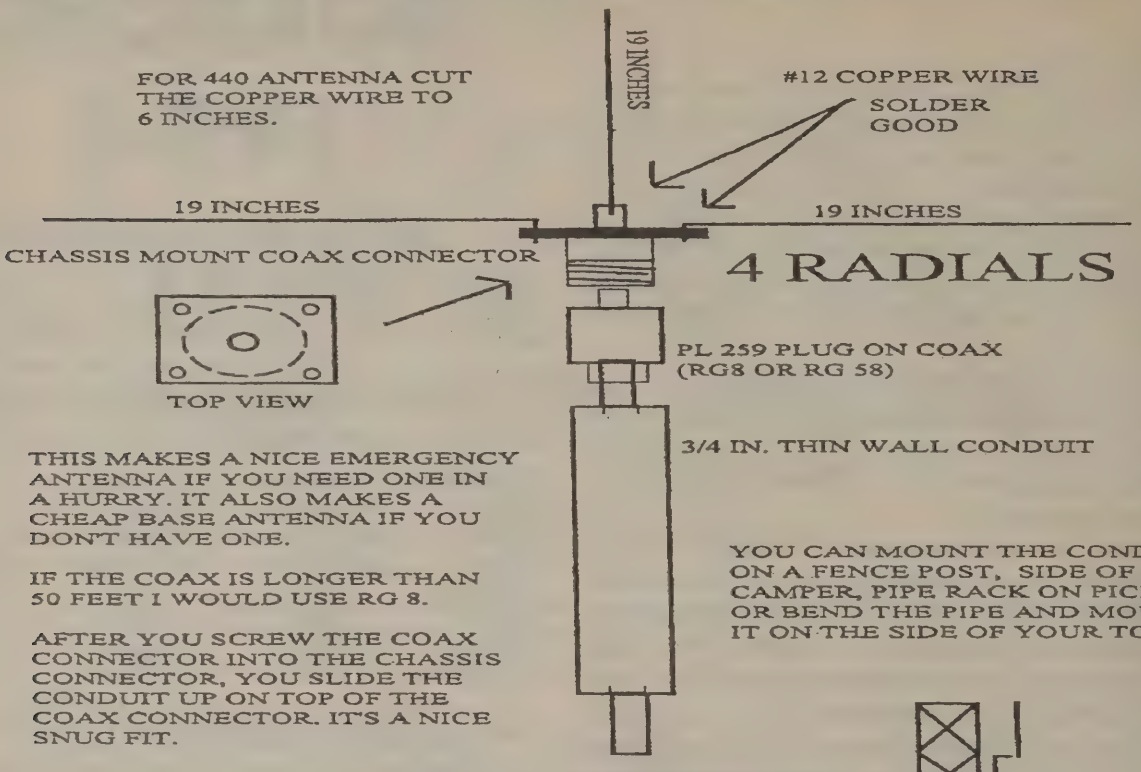
☐ D. ANIMATION
☐ E. EDITING
☐ F. PRODUCTION SUPPORT
☐ G. INDEPENDENT VIDEOGRAPHY
☐ H. TRAINING/EDUCATION
☐ I. ENGINEERING
☐ J. OTHER _____

FROM LINCOLN TRAIL AMATEUR RADIO CLUB


FOR 440 ANTENNA CUT THE COPPER WIRE TO 6 INCHES.
19 INCHES
#12 COPPER WIRE
SOLDER GOOD
19 INCHES
19 INCHES
CHASSIS MOUNT COAX CONNECTOR
4 RADIALS
TOP VIEW
PL 259 PLUG ON COAX (RG8 OR RG 58)
3/4 IN. THIN WALL CONDUIT
THIS MAKES A NICE EMERGENCY ANTENNA IF YOU NEED ONE IN A HURRY. IT ALSO MAKES A CHEAP BASE ANTENNA IF YOU DON'T HAVE ONE.
IF THE COAX IS LONGER THAN 50 FEET I WOULD USE RG 8.
AFTER YOU SCREW THE COAX CONNECTOR INTO THE CHASSIS CONNECTOR, YOU SLIDE THE CONDUIT UP ON TOP OF THE COAX CONNECTOR. IT'S A NICE SNUG FIT.
YOU CAN MOUNT THE CONDUIT ON A FENCE POST, SIDE OF A CAMPER, PIPE RACK ON PICK UP, OR BEND THE PIPE AND MOUNT IT ON THE SIDE OF YOUR TOWER.
COAX TO YOUR 2 METER RIG.

2 METER OR 440 ANTENNA

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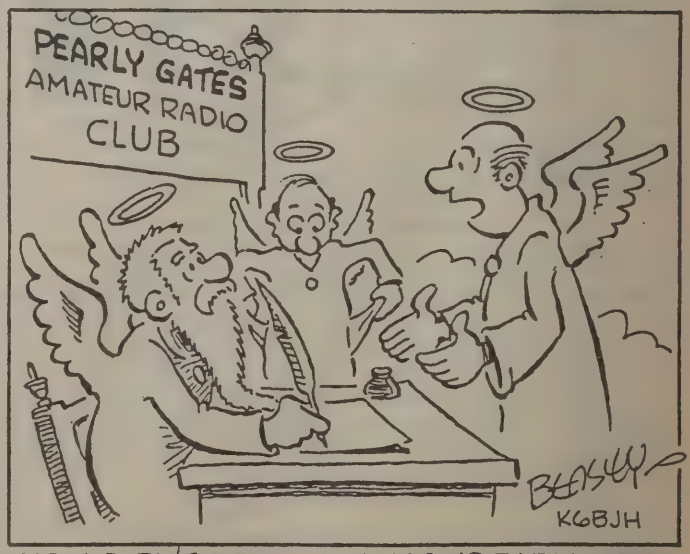


NO, I DIDN'T BRING MY AMATEUR RADIO OPERATOR'S LICENSE---THEY ALWAYS TOLD ME I COULDN'T TAKE IT WITH ME

HDTV UPDATE

Maybe the future won't be as close as predicted! by Henry KB9FO

Finding a path through the hype is difficult in HDTV land. There are conflicting reports and what few have been published in the general media are incomplete and fail to explain what each announcement means. Perhaps to "draw your own conclusion - - read between the lines--or dazzle you with brilliance" rather than try and figure out where its going. You can't believe all you read either!

Here are some thoughts based on actual ATTC efforts. The system chosen for TRANSMISSION, has NOTHING TO DO with how the picture is generated! The COFDM transmission method (Coded Orthogonal Frequency Division Multiplexing) has yet to take firm shape in the number of carriers (from 448 to as many as 13,000) the data rate varies with the number of carriers, the VLSI chips needed to decode the various systems are not yet existent, and only laboratory equipment can currently be used to work on the signal analysis.

The Grand Alliance, which chose mostly the Zenith system also incorporates many items from the other contributors. It is not a Zenith only system and bears only some resemblance to what Zenith proposed, mainly vestigial carrier sidebands and a pilot tone.

So digital TV broadcasting is still not on our immediate horizon. The cost to consumers has yet to be addressed. With the baby boomers ageing rapidly, the bulk of the US population will be retired or near retirement when HDTV is scheduled to take over. The FCC mandate of HDTV by 2008 (with simultaneous shutdown of NTSC transmission) falls when the Baby boomers, born in 1945-1955, have reached 63 years of age. How many retired folks today can afford a new $4,000 wide screen TV plus a new VCR (DVR...digital video recorder) etc. to watch reruns of *Magnum PI* or *Cannon*? OK, I prefer Rocky and Bullwinkle and action movies (Arnold Schwartzenegger, Bruce Willis, and the comedies of the Zucker Brothers --- Naked Gun, Airplane, etc). Even with inflation, Social Security won't let you afford that! The public has yet to even squeak any interest. Read any popular video magazine or electronics magazine and you will be hard pressed to read anywhere a letter from a reader saying they can't wait for HDTV and digital telecasting. I have yet to see one.

Politics rises. The Japanese announced they were going to abandon the analog MUSE HDTV direct satellite system they are using as soon as a digital system proves out. That may be a while. The first Japanese HDTV/MUSE/DBS receivers cost $30,000 which is more than a good BMW or golfing trip to Maui. Prices have dropped to $5,000, still a good down payment on a Hundai or a fully dressed out HF rig, or even a good VHF-UHF array and tower!

That much money will certainly put in a good VHS video library from your local video store or recorded off satellite or cable (perfectly legal thanks to Sony), items you are more likely to watch many times than reruns of *My Mother the Car* or *Manimal*!

$5,000 can purchase 2500 tapes, even in 2 hour mode, that is 5,000 hours or 16 hours a day for a year non stop! Compare that to 76 hours for Star Trek's complete original collection or 100 hours for ST Next Generation. Beam me up Gordie! For cheap folks, using 6 hr mode, that is 8 hours per day for six years. Probably more than all the ham TV transmissions ever made put end to end. Well, maybe not quite.

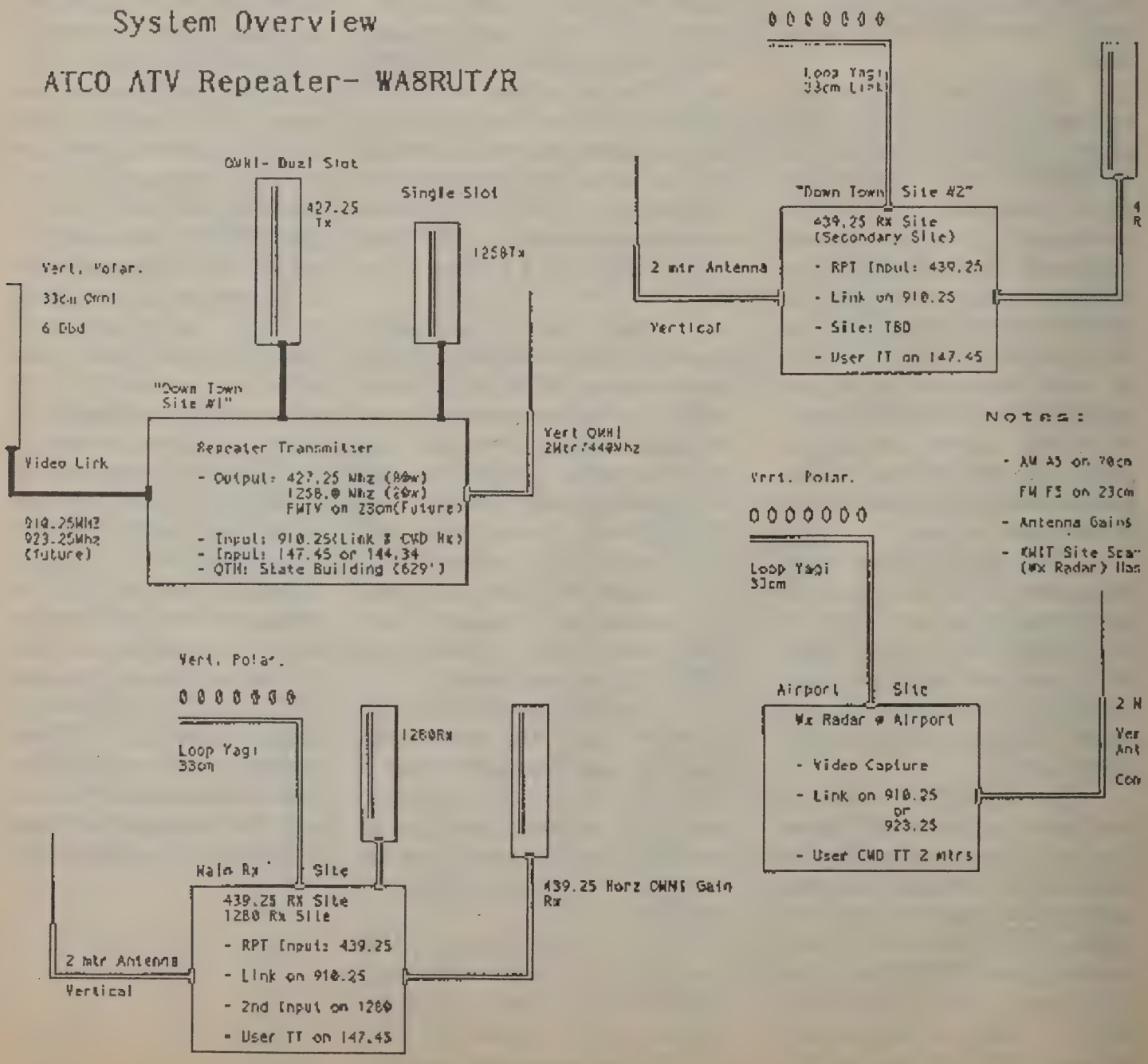
Video is certainly going digital. The TV station in a box has become a reality as computer companies are now marketing up to 24 hours of programming in a computer (no tape machines required except to load the original material) and you can extend that to infinity with programs on a removable hard drive disk. A typical HAM tv station could load up 8 Gbytes of compressed video and be ready for a year of QSO's or more. Ask anyone with a Toaster how much memory it takes to hold a 10 second CQ ATV sequence! Now compress that by 24, a common bit reduction today.

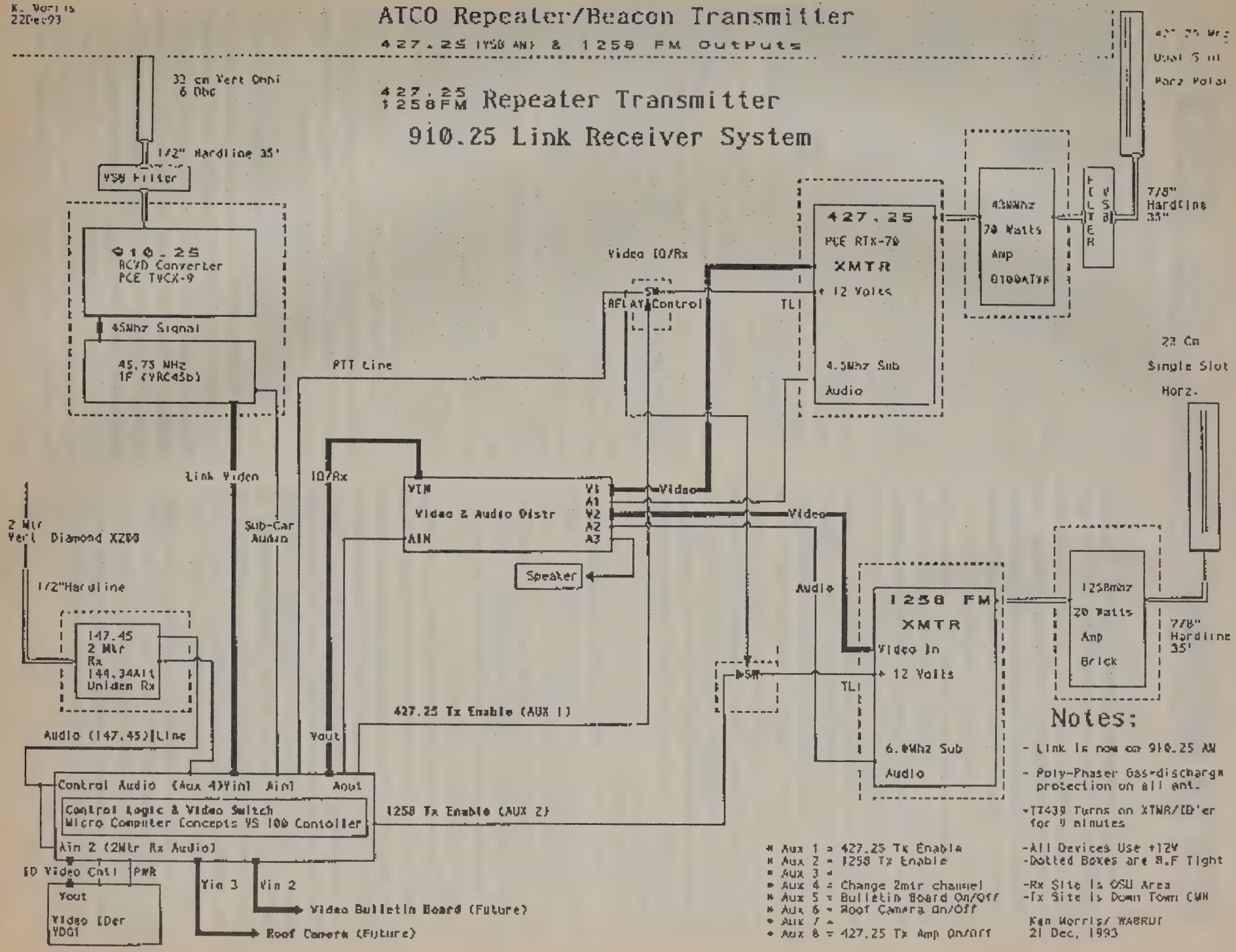
Get your computers on the air! There is no reason why you can't blaze a bit trail on 1288 MHz in realtime video direct from computer to computer. With the computers A/D and D/A functions, plug in a camera and a monitor (SVGA!) and devise a fast serial link to your ATV transmitter. The signal should easily fit within the bandwidth used by an FM video signal in the same band. Who will be the first to remake a Mel Brooks western movie into *Blazing Bits*?

ATCO REPEATER AMAZING RESULTS

And we've only started!

P5 anywhere in the central Ohio area... mobile! (20 mile radius), P5 in Maringo (35 Miles) P3 mobile in Mt. Gilead (44 Miles), P3 1/2 in Cincinnati (85 Miles), P4 in Dayton (60 Miles, P3 in Findlay (79 Miles), P3 1/2 in Bucyrus (56 Miles), Sync detected in Ft. Wayne, IN (135 Miles) etc. These are the kind of reports we have been getting since we put the transmitters up on top of the State Office Tower (650' above street level) in November. We expected the signal to be much improved, but these reports far exceed expectations! In fact, many ATVers (new and old timers alike) locally are using a cable ready TV or VCR on CATV Channel 58 (427.25 MHz) with only "rabbit ears" to monitor the repeater! The 1258 MHz repeater output (15 watts) is strong enough to be copied P5 in central Ohio with only an "LNB" satellite receiver, no pre-amp, with an outside antenna.

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22Dec93
ATCO Repeater/Beacon Transmitter
427.25 (VSB AM) & 1258 FM Outputs
427.25 1258FM Repeater Transmitter
910.25 Link Receiver System
32 cm Vert Omni
6 Dbc
1/2" Hardline 35'
VSB Filter
910.25
ACTD Converter
PCE TVCX-9
45Mhz Signal
45.75 MHz
1F (YRC45b)
PTT Line
Video IO/Rx
427.25
PCE RTX-70
XMTR
+ 12 Volts
RELAY Control
TLI
4.5Mhz Sub
Audio
43Mhz
70 Watts
Amp
Q100ATVK
7/8"
Hardline
35'
22 Cm
Single Slot
Horz.
Link Video
IO/Rx
VIN
Video & Audio Distr
AIN
V1
A1
V2
A2
A3
Video
Speaker
2 Mtr
Vert Diamond X200
1/2"Hardline
147.45
2 Mtr
Rx
144.34A11
Uniden Rx
Sub-Car
Audio
Audio
1258 FM
XMTR
Video In
+ 12 Volts
TLI
6.8Mhz Sub
Audio
1258mhz
20 Watts
Amp
Brick
7/8"
Hardline
35'
427.25 Tx Enable (AUX 1)
Audio (147.45) Line
Vout
Control Audio (Aux 4) Vin1 Ain1 Aout
Control Logic & Video Switch
Micro Computer Concepts VS 100 Controller
1258 Tx Enable (AUX 2)
Ain 2 (2Mtr Rx Audio)
ID Video Cntl PWR
Vout
Video IDer
YDG1
Vin 3
Vin 2
Video Bulletin Board (Future)
Roof Camera (Future)
Notes:
- Link is now on 910.25 MH
- Poly-Phaser Gas-discharge protection on all ant.
-TT439 Turns on XTNR/ID'er for 9 minutes
-All Devices Use +12V
-Dotted Boxes are R.F Tight
-Rx Site is OSU Area
-Tx Site is Down Town CMH
Ken Morris/ WA8RDT
21 Dec, 1993
* Aux 1 = 427.25 Tx Enable
* Aux 2 = 1258 Tx Enable
* Aux 3 =
* Aux 4 = Change 2mtr channel
* Aux 5 = Bulletin Board On/Off
* Aux 6 = Roof Camera On/Off
* Aux 7 =
* Aux 8 = 427.25 Tx Amp On/Off

ATCO REPEATER

A Major pleasant surprise is that the 910.25 MHz link receiver survives with 24 different 800-900 MHz transmitters in the same room as ours, with all of the antennas nested together! Anyone who has tried to generate a 910.25 signal (even with milliwatts!) has been copied and repeated! In fact, the link transmitter (on 900 MHz) carrying the 439.25 MHz input is only running about 1/2 watt some 8 miles away.

During the last space shuttle (the "service call" on the telescope) Tom, KA8ZNY, provided the NASA Select Video via his TVRO system and linked it to the repeater on 910.25 MHz (great pictures Tom, Thanks!). During the past few weeks, Art WA8RMC and I have been busy "tweaking" and fixing and tweaking some more. In the past couple of weeks, we've had trouble keeping the Sub-carrier audio tweaked and staying tweaked! The video in and outs on both 427.25 and 1258 MHz seem stable now. Art, WA8RMC, did a "super tweak" on the 427.25 Interdigital filter using his newly built sweep generator. The 910.25 Rx is working fine and the 439.25 receive site is working well but needs a better antenna (currently using a single mini-wheel).

What's next?

Current projects in the works include Weather Radar Video capture and link transmitter being designed by Art, WA8RMC. The overlay Video ID and Tone Decoder for the Wx Radar part of the system has been built and supplied by Chuck, WB8LGA. Dale, WB8CJW is actively working on the control receiver, Tone Decoder and control logic for the 439.25 & 1280 Receive site.

We have received two Micro Computer Concepts VS-100 Video controllers. One will be installed at the transmitter site and the other one, purchased by Tom, KA8ZNY, will be used to remote control the NASA Select Link and other sundry things which Tom may have in mind. The new transmitter site controller will provide about 30 different control operator and user command functions including possible additions of a video bulletin board and a roof top camera. Some of the functions the new controller will be able to perform, once installed, include:

1. Beacon mode (Video ID On) much like today.
2. Repeat one minute, sync detected or not. (handy for zeroing your antenna)
3. Periodic Transmit (20 sec every 10 minutes) (Handy for DX stations looking for band openings)
4. Audio select Sub-carrier or 2 meter audio (4 Channels total)
5. Ten (10) Channels of video select (2nd, 3rd Rx, Bulletin board, remote camera, etc)
6. Scan all 10 channels
7. Scan all Rx channels
8. Up to 8 on/off functions (Power Amp On/off, etc)
9. Touch Tone Pad Test Function (you press TT number and it sends it back in Morse code on the 4.5 sub)
10. Various control enable disable, various timers and other functions for the control operator.
11. Sub-carrier CW Idler.

Located at other sites will be TT decodes for turning on the weather RADAR, NASA Select and other functions. A list of active user command Touch Tone Codes will be published in the next issue of the ATCO newsletter.

Naturally, a project like this will take several more months before all of the listed functions are installed and functional. However, the present operational system has caused our ATV ranks to swell over the last couple of months as indicated by the number of check-ins at 9:00 PM on the 147.45 MHz Tuesday night ATV net.

I would like to take this opportunity to again thank some of the people who have contributed time, components and money to the ATCO Repeater systems. Chuck, WB8LGA has been a treat help with advice, time, ID and Tone decoder modules. Bill, W8DMR has contributed his advice and repaired the VOR! Roger, WB8DZW has provided us with valuable signal reports and contributed a power supply and chassis for the machine. Wilbur, K8AEH has contributed signal reports and money for the effort. Rico WA3DTO, Bill WB8URI, Fred K8JGY and Dick W8RVH have all played an important role in their encouragement, valuable advice, time and signal reports. Dale WB8CJW has constructed several of the modules used in both the transmitter and the receive sites which have proven to be quite reliable, even under a great deal of abuse!

Special thanks must go to Art, WA8RMC for his many hundreds of hours (and dollars!) in this project and literally, this project would not have been possible without Art's drive, coordination and overall contribution.

(ED NOTE: Ken is modest and does not give himself credit. Likewise, if HE hadn't participated, none of this would have been possible. Ken has many pieces of equipment at his disposal to try without going out and purchasing it first. I'll let you in on a secret. He has a great affinity for antennas. Any hamfest that has any unusual antenna for sale will attract Ken. So, when it came to antennas, we had first hand knowledge of the designs that definitely wouldn't do the job and ideas that ultimately resulted in the final design that does do the job. Additionally, Ken's place of work had an accessible roof upon which to test the antenna as well as various repeater designs easily.)

ATCO RPT

And I'm sure TOM, W60RG at PC Electronics must be thanking us because we bought enough of his products to able to buy a new helicopter by now! If not, not to worry Tom...we will have more orders coming! A block diagram of what the Transmitter site should look like in January, 1994 is on the previous page. Not shown on the diagram is the local Video monitor, Waveform monitor, various power supplies, A.C. & ground distribution panel and the lightning protection on all Hardline runs and A.C. input, manufactured by Polyphaser (all currently installed). Also not shown are the Repeater receive site equipment, Weather Radar link and the NASA Select feed system. Some of the key system specifications are as follows:

* Transmitters: - 427.25MHz 200 W ERP peak VSB - 1258.25 MHz 30 W ERP FM Video
* Antenna system: - 70 cm Dual Slot (7dbd gain) w/60 ft of 7/8" Hardline - 23 cm Single Slot (3dbd gain) w/60 ft of 7/8" Hardline - Both antennas: Horiz OMNI
* Video Link: - 910.25 (A5) 4.5 MHz Sub-carrier - antenna: Vertical OMNI
* 2 Mtr Voice: -147.45 MHz, User command frequency & voice repeated on Sub-carriers Antenna: Vertical OMNI
* User Rx Inputs: - 439.25 MHz (active now) - 1280 MHz FM (future) - Receivers linked to transmitter via 910.25 MHz (A5) - Antennas: Horiz OMNI
* Modes of operation: - Beacon Mode (TT 439 up, TT #0 Down)
- Repeater Mode: Sync Detect (VOR)
- New controller expected to be installed in January, 1994 that will add several more modes of operation.

Check-in to the Tuesday spin ATCO net on 147.45 for updates on the Repeater progress and new developments .
de Ken WA8RUT.

FIRST QUEST COMMERCIAL DX AWARD

Goes to SWL QA9A, Michael Condon of Poynette, WI who made a 144 mile TV contact (P5) on 3-14-94. His certificate is in the mail. As of this writing we are awaiting the first HAM TV appications for the award program. Get those DX and contact reports in early!

Update at the ATVQ party friday night Dayton.

ANCIENT TV

Very Rare Glimpse into Earliest TV Systems. Vision by Radio, Radio Photographs and Radio Photograms. Illustrated review of existing machines from Nipkow and others Over 140 pages in this completed work with emphasis on the Jenkins inventions and systems. If you ever wondered how we got to digital TV (the hard way) this will titulate your curiosity.

Another book, Photocells and their applications, by Zworykin and Wilson, gives you a complete 1934 eduation on solar cells which led to the development of television. More than 340 pages . Now follow this with Experimental Television. Build yourself a complete TV station. Not with tubes, CCD's or transistors, but with scanning disks. Over 185 illlustrations, including a complete TV transmitter. Over 313 pages .

OK, now where can you find all this stuff and a few dozen books on Tesla, including his complete works? In a free catalog from Lindsay Publications, PO Box 538, Bradley, IL 60915. If the wierd, scientifically strange and historically accurate interest you, these folks have more than enough books to satisfy. No TV buff should be without many of their publications. Tell them ATVQ sent you. Phone 815 935 5353! Ask for the Technical books catalog.

ATVQ MAKES IT BIG TIME AGAIN

HOME BROADCAST is the title of an article in the April 1994 issue of Videomaker Magazine. Written by David Laustsen, an Amateur Radio operator himself, the article details in laymans language how simple it is to get a no-code license, and get their home video productions onto ham TV. The story leads the reader to inportant information sources, ARRL, ATVQ, and even Radio Shack (for the book "Now You're Talking"). The article also mentions ATV repeaters, lookie-talkies and other ATV gear. Also listed are three manufacturers (well AEA ain't no more) Wyman and PC Electronics.

The article, while short, is well written, to the point and covers all salient points of ham radio and ATV. ATVQ has already received many inquiries about how to become a ham and how to get on ATV. We are responding with information on the ARRL, NARA, a sample copy of ATVQ and will supply the mailing list to ARRL/NARA for their follow on. Our hearty thanks to David Laustsen.

1994 PHD KC Midwest Amateur Radio Convention

Welcome to the PHD KC Midwest Amateur Radio Convention. The 1994 Convention will be held Saturday May 21st, open hours 8:30 a.m. to 5 p.m. Exhibitors may setup 2 p.m. to 7:30 p.m. on Friday and after 7:30 a.m. on Saturday. Over 60,000 feet of carpeted exhibit space, all one level, no steps, wheel chair accessible! Escalator or elevator will take you to the snack bar and viewing area.

Eight doors allow for easy unloading, and the farthest anyone will have to wheel their items for sale is 150 feet. Four wheel carts will be available. Over 400 8 foot tables and 60 commercial booths are available. PHD will confirm all registrations postmarked by May 8, 1994. After May 8th, they will be held at the door. This year a service fee of .50 cents is added to your registration. This fee will pay part of the cost of returning your registrations and badges. PHD will pay for the additional postage required. Be sure to inclose a sheet of paper with additional names and calls if you order more than one registration. If you should want your tables next to your buddy, register by April 15, let us know who, and if he is registered, we will try to place your tables next to his.

The KC Market Center has proved to be an outstanding facility to hold an amateur Radio Convention. Over 2,000 free parking spaces. Free RV parking (no hookups). KC Market Center is conveniently located just Northwest of US I 435 and Front Street. Use exit # 57 off US I 435 and West to first light and North to the site. Exit 57 is about 3 miles North of US I 70 or first exit South of the Missouri River on US I 435.

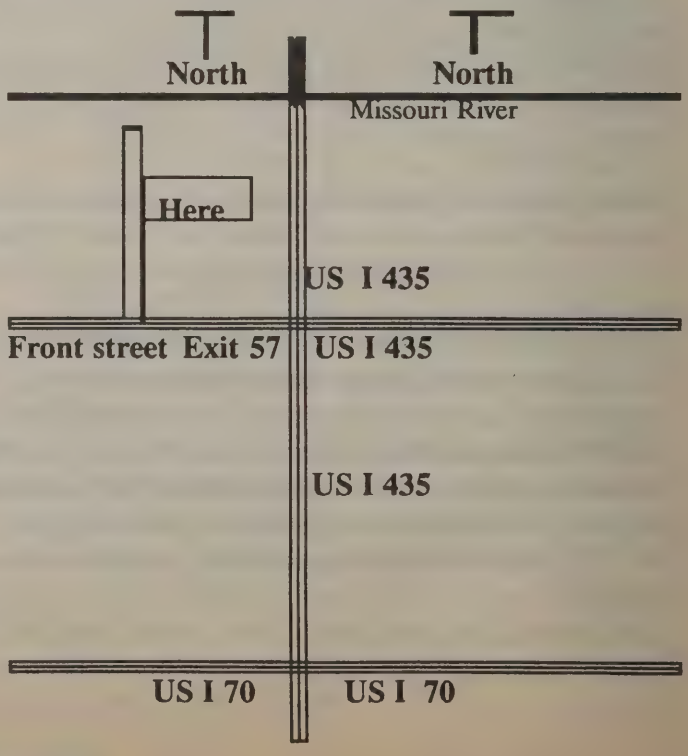
Lots of forums and seminars will be held. Mr. Robert Inderbitzen, NQ1R, ARRL Education Staff will host an youth seminar from 8:45 a.m. to 10 a.m. Those attending 16 and under will receive a free pass to the Convention. Mr. Inderbitzen will conduct and instruction seminar for schoolteachers and amateurs who teach classes from 10 a.m. to 12:30 p.m. Mr. Richard Straw, N6BV, ARRL Technical Staff will have two seminars "Stealth-Invisible Antennas" and "Best Elevation Angles for DX". Midwest ARRL Director Lew Gordon, K4VX, will host an ARRL Forum at 2p.m. Other programs ATV,Packet, QRP, YL , others to be added.

Talkin Frequency 146.34/94 Repeater.

Prizes: Due to postal regulations we cannot list all of our prizes, but at least seven amateurs will take home an HT. Some twenty five others will not go home empty handed. You must be present to participate. Those purchasing registration at the door must fill out both portions and deposit the drawing stub before entering. Convention badges will be available inside the convention. Your badge will let you go and come as you please. Walkin registration will open at 7:45 Saturday morning.

Hotels: Park Place, on site $65.00, call 483-9900 or 1-800-821-8532, mention PHD for rate. Comfort Inn located US I 435 and Front Street, $38.00, call 483-7900 or 1-800-221-2222. Other close by hotels, Holiday Inn and the Red Roof Inn.

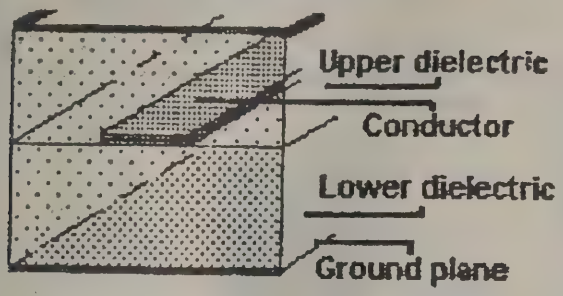
Plan now to make the weekend of May 20-22 a big Kansas City weekend for the family to remember. The KC Market Center is located two miles South of Worlds of Fun and Oceans of Fun. Plan now to bring the whole family and have an weekend to remember. This is one year you don't have to hear "but daddy what are we going to do"? This is the weekend before Memorial Day and not Memorial day weekend. In 1995 our date will be Saturday May 20th.



10 GHZ FUNDAMENTALS

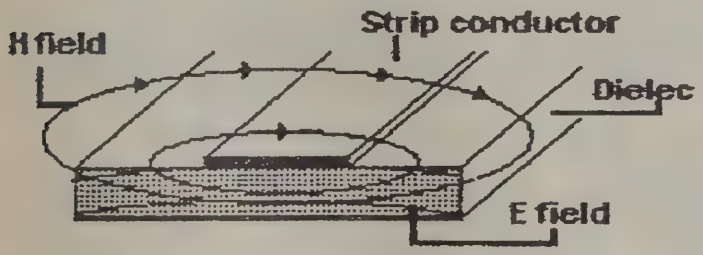
from P5, Severnside newsletter.

Part 2: Stripiline & Microstrip



Stripline Stripline construction is not normally employed by the amateur constructor for microwave circuits because it is very difficult to predict the impedance characteristics within the stripline. There are many variables to consider when designing a stripline to have a particular impedance. These include the dielectric constant and permitivity of the PCB and the width and thickness of the conductor. However the main advantage of designing in stripline is that the mode of prorogation is TEM, similar to mechanical waveguide. The result is an efficient prorogation of RF along the length of stripline.

Microstrip

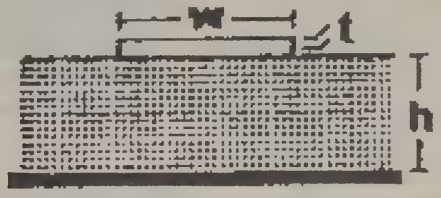


The amateur constructor will normally build a microwave circuit on Microstrip. This techniqe enables direct connection from the conductor to a device in the circuit. Microstrip is essentially stripline with only one groundplane. It is non TEM type of transmission line but because it is easier to fabricate a microstrip circuit from double sided PCB, it is widely used as a method of constriction.

Calculating the characteristic impedance

Because all of the electromagnetic field is contained in the dielectric, the dielectric consent is not as high as strip line. The effective constant is determined by the ratio of substrate dielectric and air. The width of the conductor ratio to the substrate thickness determines the line impedance. Roughly, a ratio of 2 to 1 equates to 50 Ohms. The ratio also affects the velocity factor and hence wavelength. The conductor is also dispersive and therefore it is important to obtain accurate information about the PCB material before committing to a particular design. It is not a good idea to use generaI purposexpoxy GRPB at these frequencs because of relatively low permitivity and highlosses. It is more common to use FR4 PTFE / glass fibre PCBbut this is much more expensive.

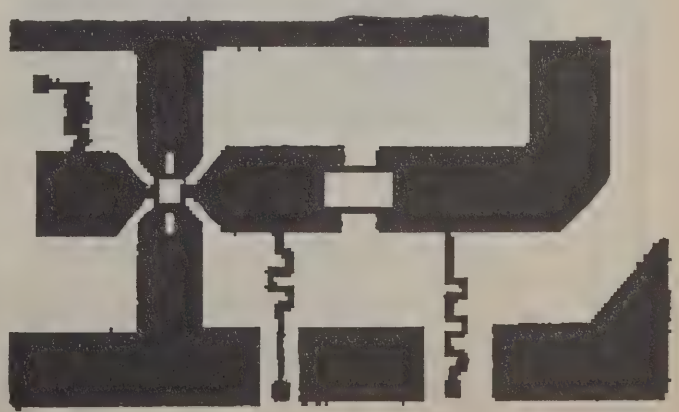
where w is the conductor width, h is the dielect height, e is the dielectric constant and, t is the conductor thickness.



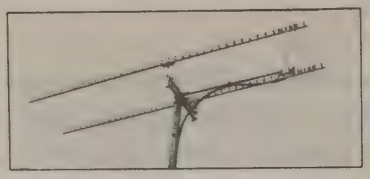
$$Zo = \frac{60}{\sqrt{(0.475 + 0.67/e)}} \times \ln\left(\frac{h}{(0.134w + 0.168t)}\right)$$

Construction technique;

The FR4 PB is printed and etched in the usual manner, take care not to etch any ground plane away. Provide plenty of ground vias to minimize ground inductance near virtual ground decouplers. Do not use isothermal vias, they will have an inductance. The usual method of through hole grounding is to use Veropins soldered each side. These will also help to sink heat away from a power device. When assembling aproject on microstrip, be aware that any excess solder on a SMT joint will alter the effective thickess of the conductor strip. It is a good practice to mop us excess solder after a flowing using solder wick. This is especialy important near active devices where continous impedances are required. Due to their physical size, SMT components are particularly susceptible to overheating when soldering.



DOWN EAST MICROWAVE



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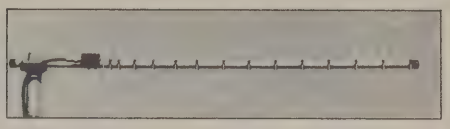
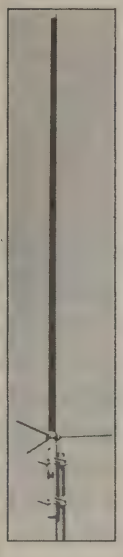
Mounting Mast Diameter: 1'-2½"
Connector: N-Type
Construction: All Aluminum





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Weight: 2 lbs. 8 ozs.
Connector: N-Type
Construction: Heavy Duty Fiberglass

CA-1221S
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Base/Repeater Antenna
1/2 Wave 21 Step
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Gain: 15.5dB
Impedance: 50 ohms
VSWR: 1.5:1 or less
Max. Power: 100 watts
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Weight: 2 lbs. 3 ozs.
Mounting Mast Diameter:
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Connector: N-Type

PYA-913
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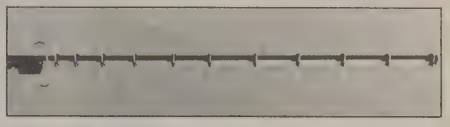

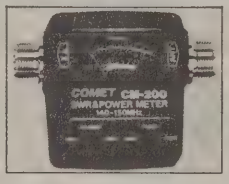

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CM-300	200-240MHz	60 watts	0.2dB
CM-400	420-460MHz	50 watts	0.2dB
CM-420	140-460MHz	50 watts	0.1-0.2dB
CM-900	840-950MHz	60 watts	0.2dB
CM-1200	1225-1325MHz	60 watts	0.25dB

Measurements: 2.25"w x 2.25"h x 1.1"d
Weight: 5.25 oz
CM-200, 300 and 400 have SO 239 Connectors
CM-420, 900 & 1200 have N Connectors

FP-19
Base/Repeater
905-925MHz
Gain: 16dBi
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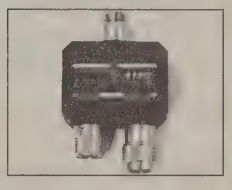
VSWR: 1.2:1 or less
Max. Power: 100 watts
Length: 7' 4"
Connector: N-Type
Construction: Heavy Duty Fiberglass

CF-4130 446/1200MHz
dB Loss: 1.3-460MHz 0.2dB,
900-1400MHz 0.3dB
Band Rejection: 55dB Down
Max. Power: 146MHz 800W PEP,
446MHz 500W PEP,
1200MHz 200W PEP
Connectors: N-Type



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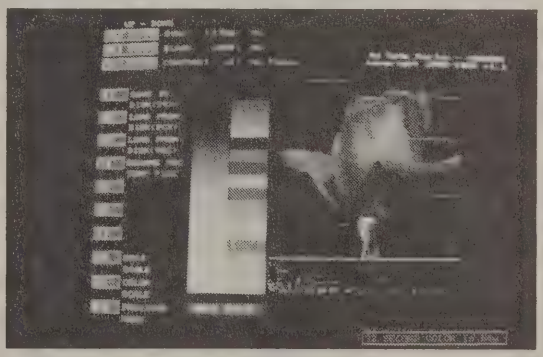

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23 CM FM ATV TRANSMITTER USING SURFACE-MOUNT TECHNIQUES

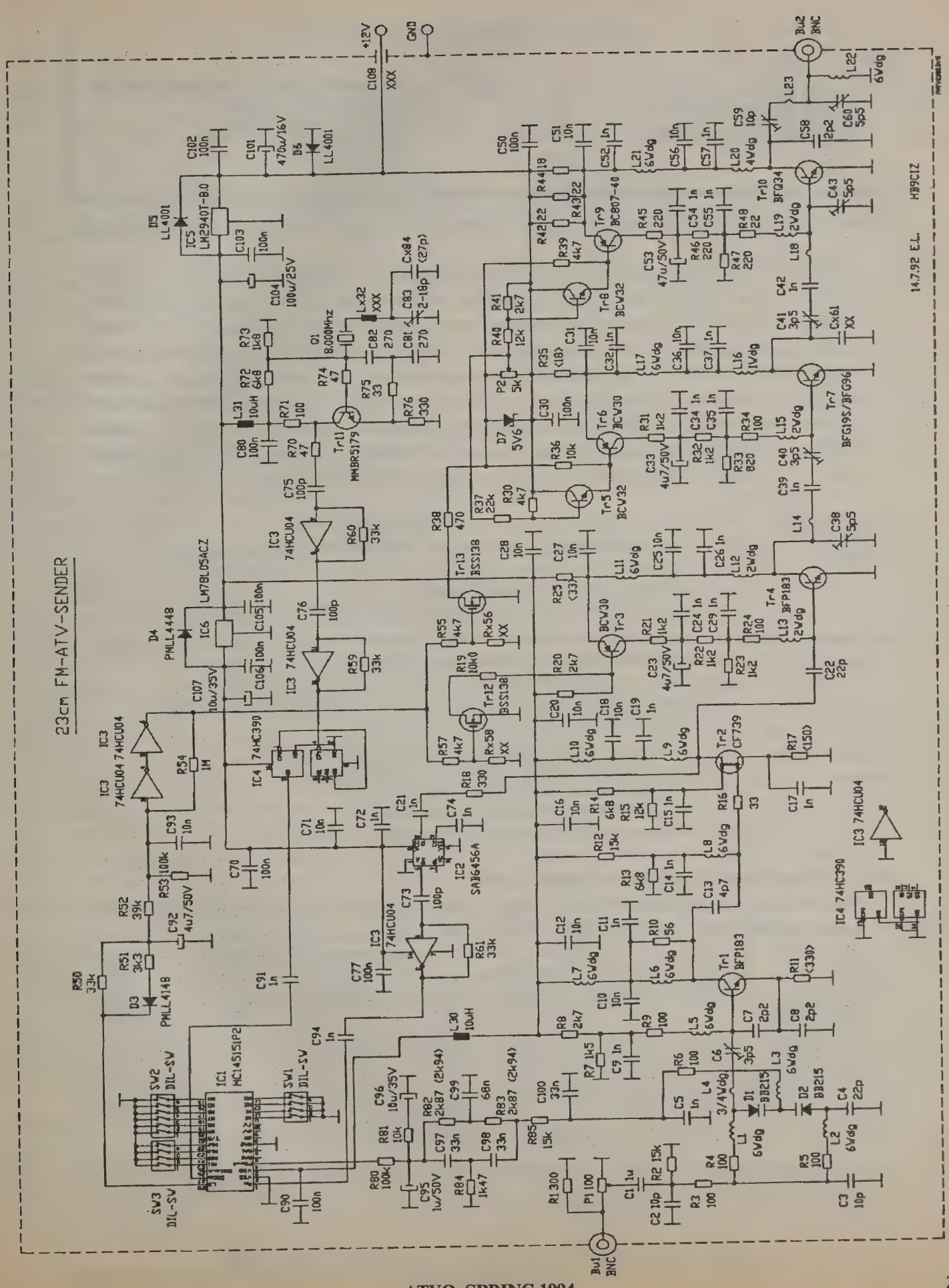
By Erhard Luethi, HB9CIZ
First published in TV-Amateur issue 90/93
translated from the German by Andy Emmerson G8PTH

PLL-controlled transmitters and receivers are finding increasing use in amateur television. Very often these are home-built. And surface-mount technology is being exploited increasingly in this field. In order to become QRV on 23cm FM ATV I decided to acquire the appropriate hardware. After brief evaluation of the kits on the market I decided to follow the home-made route.

CIRCUIT DESCRIPTION The transmitter is carried out in five stages. In greater detail it contains a PLL which can be preset in 100 KHz steps. An 8 MHz crystal is used as the reference. Power supply voltages are stabilized internally at five and eight volts, the 8 V regulator being a low dropout version. The last two transistors operate with the full power rail voltage. The transmitter can be operated on around 9 to 14 V, nominally it is for 12 V. In this case the power from the BFQ34 is around one watt. The PCB uses SMD components on the track side and conventional components on the other side. This gives the advantage of high packing density and of short conductor lengths. The crystal oscillator is constructed from discrete components and uses a standard 8 MHz timer crystal. If a crystal with load capacity is used, a wire strap should replace Lx32. The 8 MHz signal is brought up to the 5 V level through two 74HCU04 ICs and divided by 10 in a 74HC390. This is now taken to the MC145151. The reference divider is preset to 512 (RA2 0 V) and counts down to 1562.5 Hz. Together with a prescaler SAB6456A set to divide by 64 this produces 100kHz frequency intervals across the 23cm band. The loop filter has a relatively large time constant. This necessary to ensure that low frequency components of the video signal are not regulated out by the PLL. At the same time a high division ratio for the 1275 MHz signal contributes to making the modulation deviation adequate for satellite tuners also (+-10 MHz is no problem).

Additionally the control voltage for the VCO passes through a passive notch filter for 1562.5 Hz (T bridge). This also helps remove any residual 1562.5 Hz component on the control voltage. The VCO is nothing out of the ordinary except that the adjustment voltage is applied to the cathodes of the two capacity diodes and the baseband signal to the anodes of these. This has the advantage of keeping the baseband input and the loop filter apart (phase of the loop filter not affected by the video input coupling). The oscillator signal is fed out to the collector of TR1 and further decoupled in a Dg-GaAsFET TR2. On the drain of TR2 the 1275 MHz signal for the prescaler is also led away via the SAB6456A. This is a sensitive prescaler from Philips intended for TV tuners and has a frequency range guaranteed up to 1300 MHz. The output signal is amplified again by a 74HCU04 before reaching the input of the PLL IC. Following on from TR2 is a three-stage amplifier with its operating point needing to be stabilized. In this way the emitters of the transistors can be connected direct to ground, which is very necessary in this frequency range (we can't have trapezium and other decoupling capacitors sticking out).

The operating points are quite stable with changes of temperature using this circuit. Using the trim pot P2 the quiescent current of TR7 and TR10 can be controlled and in this way the output power can be varied by up to 13 dB. Since FM signals do not need to have amplitude linearity this is a permissible method. For linear applications the output level could not be adjusted in this way under any circumstances!. The quiescent currents of the RF transistors remain stable also with variations of power supply voltage (relative to maximum power). Taking this further, the quiescent currents are not set until the PLL is locked. As a result the output power immediately after switch-on is minimal until the PLL notches. Unfortunately screening is necessary for the VCO and amplifier. The completed PCB, if handled with sensitivity, gives stable operation. It was built into a tinplate box 147 x 72 x 29 mm and as soon as the lower lid was fixed, feedback effects were noted on the de-


23cm FM-ATV-SENDER
14.7.92 EL. HB9CIZ
+12V
GND
Bu1 BNC
Bu2 BNC
IC1 HC14515IP2
IC2 SA86456A
IC3 74HCU04
IC4 74HC390
IC5 LM2940T-8.0
IC6 LM78L05ACZ
Tr1 MMBR5179
Tr2 CF739
Tr3 BCV30
Tr4 BFP183
Tr5 BCV32
Tr6 BCV30
Tr7 BFG19S/BFG96
Tr8 BCV32
Tr9 BC807-40
Tr10 BFQ34
Tr11 MMBR5179
Tr12 BSS138
Tr13 BSS138
Q1 8.000MHz
D1 BB215
D2 BB215
D3 PMLL4148
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viation of the modulation. This led me to install separate screening above and below, which got quite complicated.

ASSEMBLY The circuit is built up on a piece of FR4 epoxy board, 71.5 x 145.7 mm. Components are fixed on both sides of the PCB but without through-hole plating, hence many pieces of wire for making through contacts. First the PCB is made the correct size to fit inside the case. Once components have been inserted no more filing is advised because the ceramic capacitors are very fragile. Next the cutouts for the BNC connectors are filed out and room made for the BFQ34. Next we make the holes for the leads of the conventional components, after which we can solder in the pieces of wire for through contacts and the wire links (straps). The through contacts are made of 0.5 mm diameter tinned copper wire, bent into a U shape with a side spacing of about 2.54 mm and about 5 mm length. The wire links are made of copper wire 0.35 mm diameter. The U-shaped through contacts are pushed through from above and first soldered on this side. On the other side they are shortened to about 1.5 to 2 mm and then soldered.

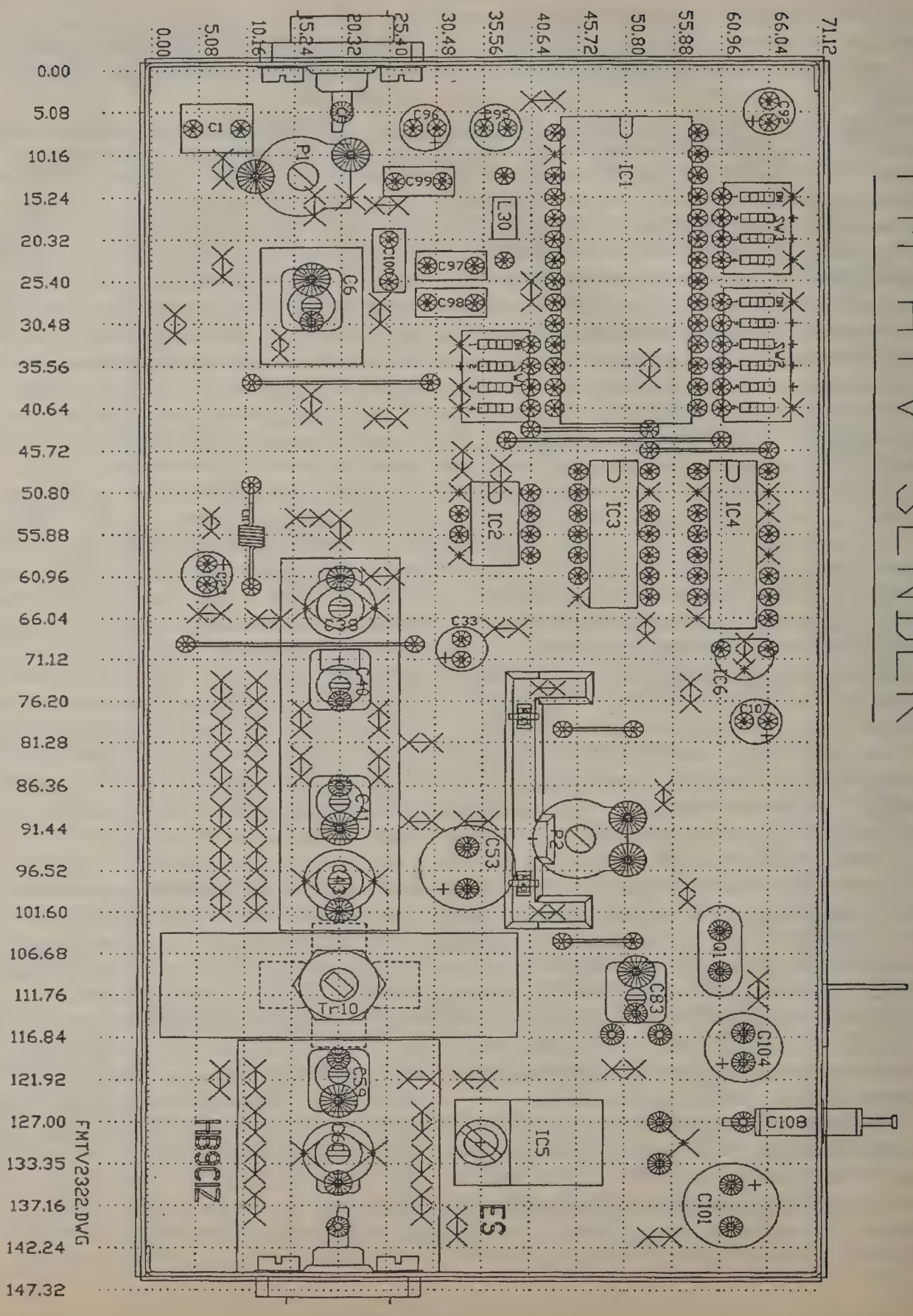
The copper foil for through contacting of the emitter connections of the BFQ34 are also offered up, trimmed and soldered in. Next we solder to the upper side of the PCB the fixing sheet for the fixture screws of the BFQ34. Screwing in of the final transistor is done from the upper side. This gives really good heat dissipation. Once this is all completed we can proceed with fitting the conventional components. In my three examples I used sockets for the 145151 and soldered in the remaining ICs direct. Under no circumstances should the prescaler be socketed. Last of all fit the BFQ34 but check first that it fits. Warning. All components indicated X must be soldered to the upper side. The 8 V voltage regulator is also fastened direct to the PCB with a 3 mm screw to make for better heat dissipation. If threaded connectors are used, the PCB should be drilled 4.5 mm, otherwise 3.3 mm. Next the coils should be made up as indicated and their ends tinned. They are made from solderable enamelled copper wire (varnished copper wire). After the SMD components the coils are soldered in. Finally the BFQ34 is fixed. If everything has been fitted according to the component list and the coordinate instructions, then nothing should have been forgotten.

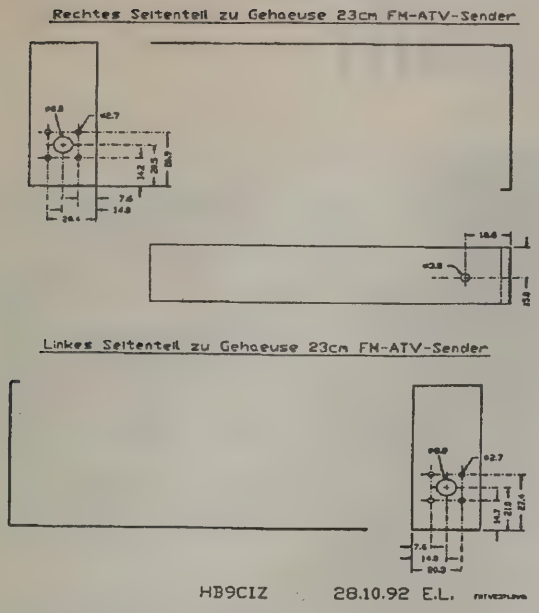
The coordinate list allows you to find any component on the PCB rapidly. Following this method I built two examples of the transmitter at the same time in December 1992. It is crucial that no wire links are forgotten, also that components that need connection to ground are soldered on both sides of the PCB. The DIL switch is an exception and it will suffice to solder just the outermost connections both above and below. The screening panels are only soldered on after alignment and after the PCB has soldered into the case.

ALIGNMENT First we make the preliminary setting for the rotary trimmers. Oscillator trimmer C6 is turned in about 30 per cent, C38 10 per cent, C40 45 per cent, C41 50 per cent, C43 5 per cent, C59 20 per cent, C60 20 per cent, whilst C83 is adjusted later. Now the DIL switch is programmed for 1275 MHz, which corresponds to a division ratio of 1:12750. This done, the current consumption can be measured. For this we connect up 12 V and check the current drawn; it should be about 370 mA assuming the PLL has locked and the potentiometer P2 is at the right-hand limit. Unlocked, the gate voltage of TR12 and TR13 is low and the quiescent currents are switched off, so the current consumption amounts to about 110 mA. At the same time the output is terminated in 50 ohms.

If all this is in order all of the trimmers can be adjusted for maximum output (except C6 oscillator trimmer). If this all works and the transmitter produces about 1 watt power, the crystal reference can be aligned. (Check output frequency of locked transmitter or IC3 pin 10 on exactly 8 MHz.) Next adjust tuning voltage for the capacity diodes using a high-impedance voltmeter at the junction of R85/C5/R6 and ground to 4 V. Beyond this there is little to do. Potentiometer P2 can be used to reduce the power, as when one wants to drive a PA using a Mitsubishi module. Modulation deviation is set using P1. Video polarity is 'upside down' on this transmitter because the baseband is applied to the cathode side of the varactor diodes but this is not a tragedy because I can change polarity easily at baseband. The input resistance is 75 ohms. In my home-made version this is actually quite important because I have connected video and audio inputs together in a bridge circuit and the isolation is only valid when connected into a 75-ohm load. In this manner the 1.07 or 2.07 MHz products (sound subcarrier 5.5 or 6.5 MHz) can be kept correspondingly small at the output of the baseband section. Also I don't use video low-pass filters and similar frivolities. If you include a steep video low-pass with an upper limit frequency of 5.5 MHz on the output, the result is dreadful group delay time distortion in the region of 4.43 MHz. Simulations of similar filters led me to drop the idea rapidly and also to the realization that any filter with a less than ultra-linear characteristic curve would cause the transmitter connected behind it to regenerate much that the filter had removed. If one wished to correct for the transit time of this video low-

24 CM ATV TRANSMITTER





pass, a demanding all-pass would need to be connected after it. If this were of interest I could publish something about baseband signal preparation. It is specially tailored for this particular transmitter.

If problems arise with swing oscillations in the VCO, the feedback coupling in the VCO must be altered. This did occur in the early design stages but not in the three trial examples made with the component values shown.

KEY TO DIAGRAMS :

FM-ATV SENDER = FM-ATV Transmitter

BESTUECKUNG OBERSEITE = Component layout for upper side

AUF ES + LS VERLOETET = Soldered to upper (groundplane) and lower (conductor) sides

STUECKLISTE = Component List

FOLIENTRIMMER = Foil trimmer

DURCHFUEHRUNGSFILTER = Feedthrough filter

WDG = turns CuL = enamelled copper wire

SPULE = Coil

INNEN = Inner (dimension)

PARALLELRESONANZ = parallel resonance

LASTKAP. = load capacitance

EINBAUPOSITION IN GEHAEUSE = Mounting position within case housing

BESTUECKUNG UNTERSEITE = Component layout for lower side

AUF ES + LS VERLOETET = Soldered to upper (groundplane) and lower (conductor) sides

BAUTEILKOORDINATEN ZU FM-ATV SENDER Component mounting coordinates for FM-ATV Transmitter

WINKEL = angle

BU = abbreviation for connector

ABSCHIRMUNGEN ZU 23cm FM-ATV SENDER = Screening for 23cm FM-ATV Transmitter.

ABSCHIRMUNG STRIPLINE (ALTE VERSION) (VON UNTEN GESEHEN) = screening for stripline (old version) (seen from below).

ABSCHIRMUNG LO LS = screening for local oscillator, conductor side.

BLECH 0.4 mm = tinplate 0.4 mm

ABSCHIRMUNG PA TRIMMER = screening for PA trimmers

Cu-FOLIE 0.1 mm = copper foil 0.1 mm

ABSCHIRMUNG TREIBER TRIMMER = screening for driver trimmers

ABSCHIRMUNG LO TRIMMER = screening for local oscillator trimmer

SPULEN FUER DEN FM-ATV SENDER = Coils for the FM-ATV Transmitter.

WDG = turns

ALLE SPULEN DRAHT CuL 0.355 = all coils made of 0.355 mm diameter enamelled copper wire.

EINBAU DES ENDTRANSISTORS = fitting of final transistor

MESSINGBLECH 0.4 mm = brass sheet 0.4 mm

KUPFERFOLIE 0.1 mm = copper foil 0.1 mm.

BOHRPLAN = drilling plan

NICHT BEZEICHNETE BOHRUNGEN 0.8 = holes not indicated are 0.8 mm diameter.

RECHTES SEITENTEIL ZU GEHAUESE = right hand side of casing

LINKES SEITENTEIL ZU GEHAUESE = left hand side of casing

-AND THE XYL SAID I DIDN'T SPEND ANY TIME TALKING TO HER, SO I TOLD HER TO GO OVER TO HARRY'S QTH, GET ON CAMERA, AND I'D BE GLAD TO TALK TO HER!!
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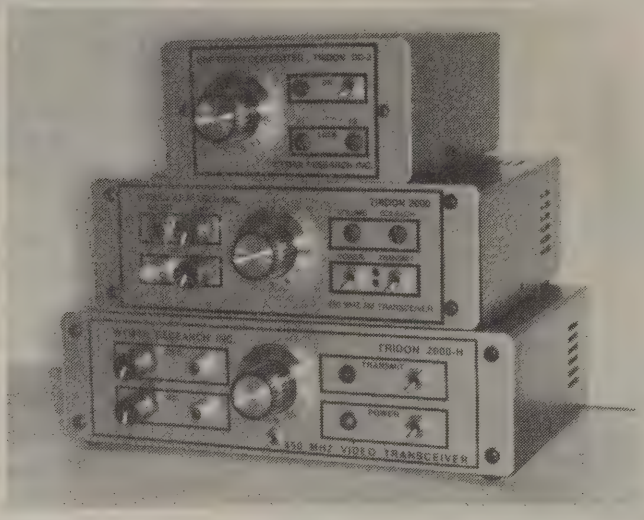

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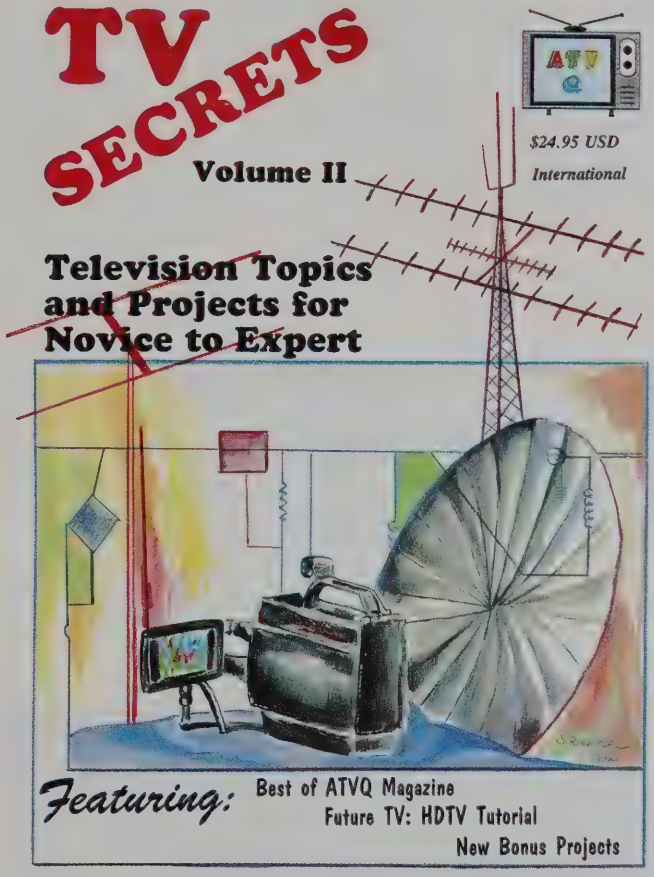

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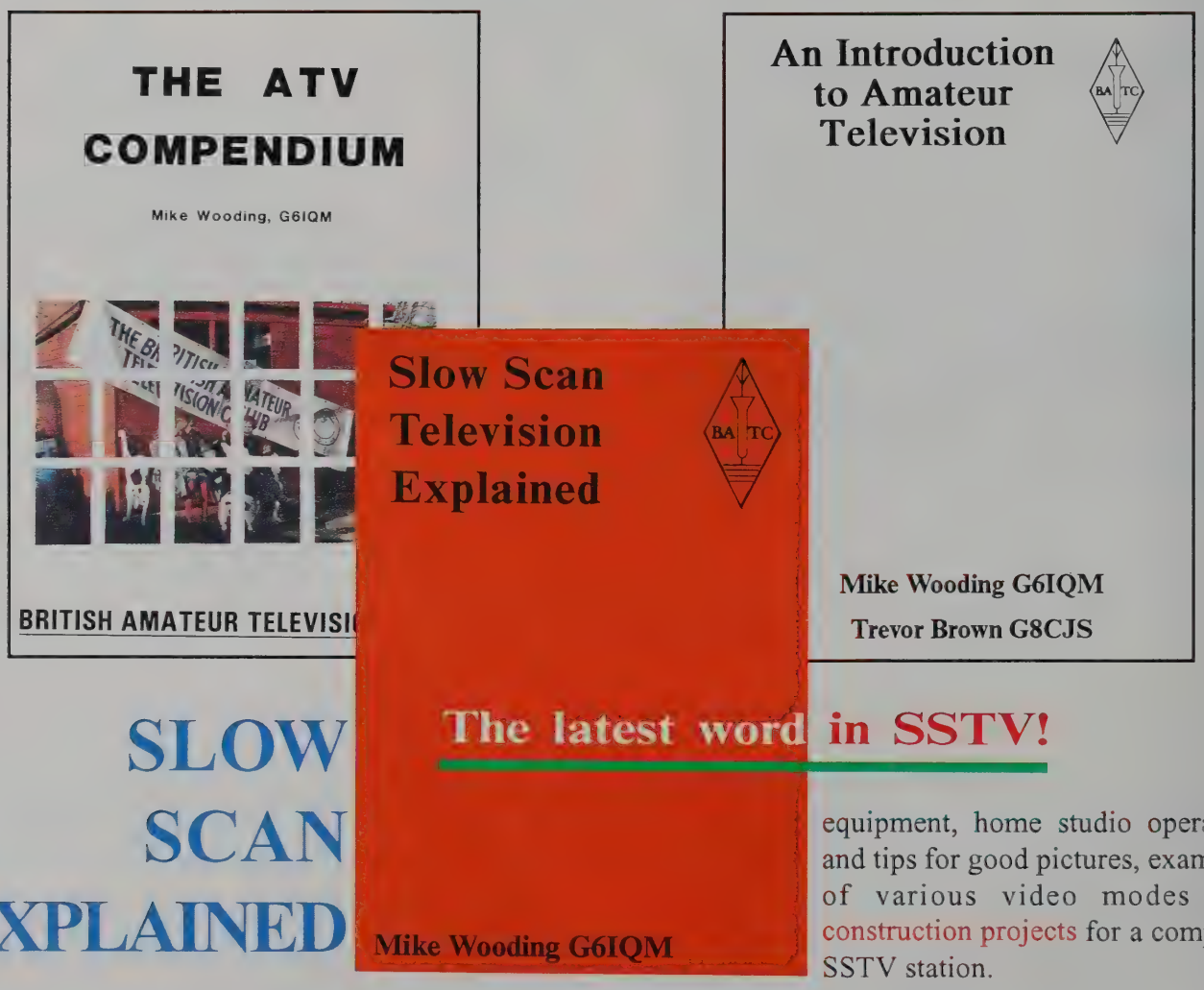

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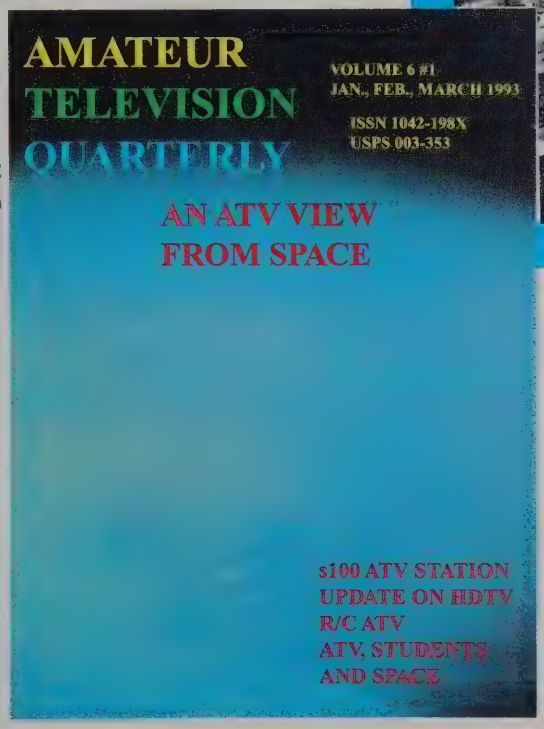

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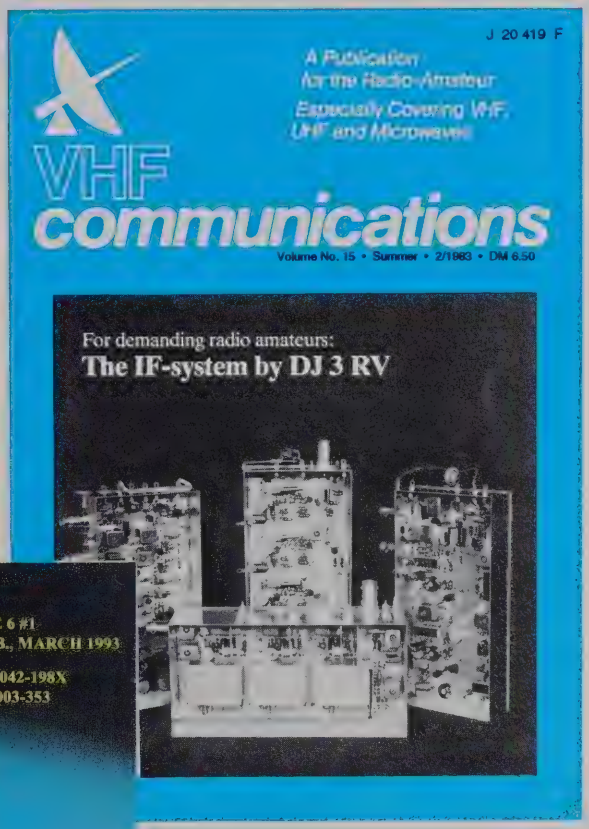

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C 8	2p2	NP0 Chip 0805
C 9	1n	NP0 Chip 0805
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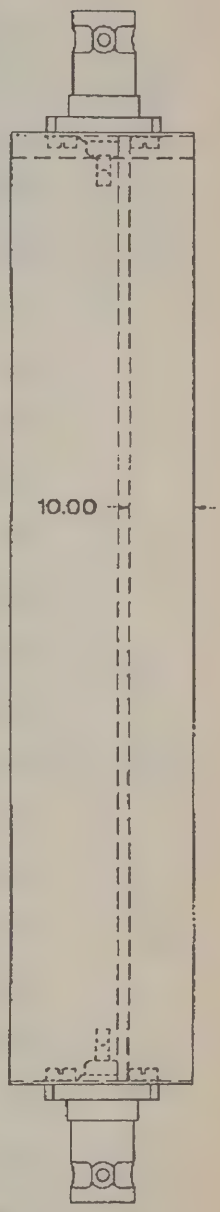
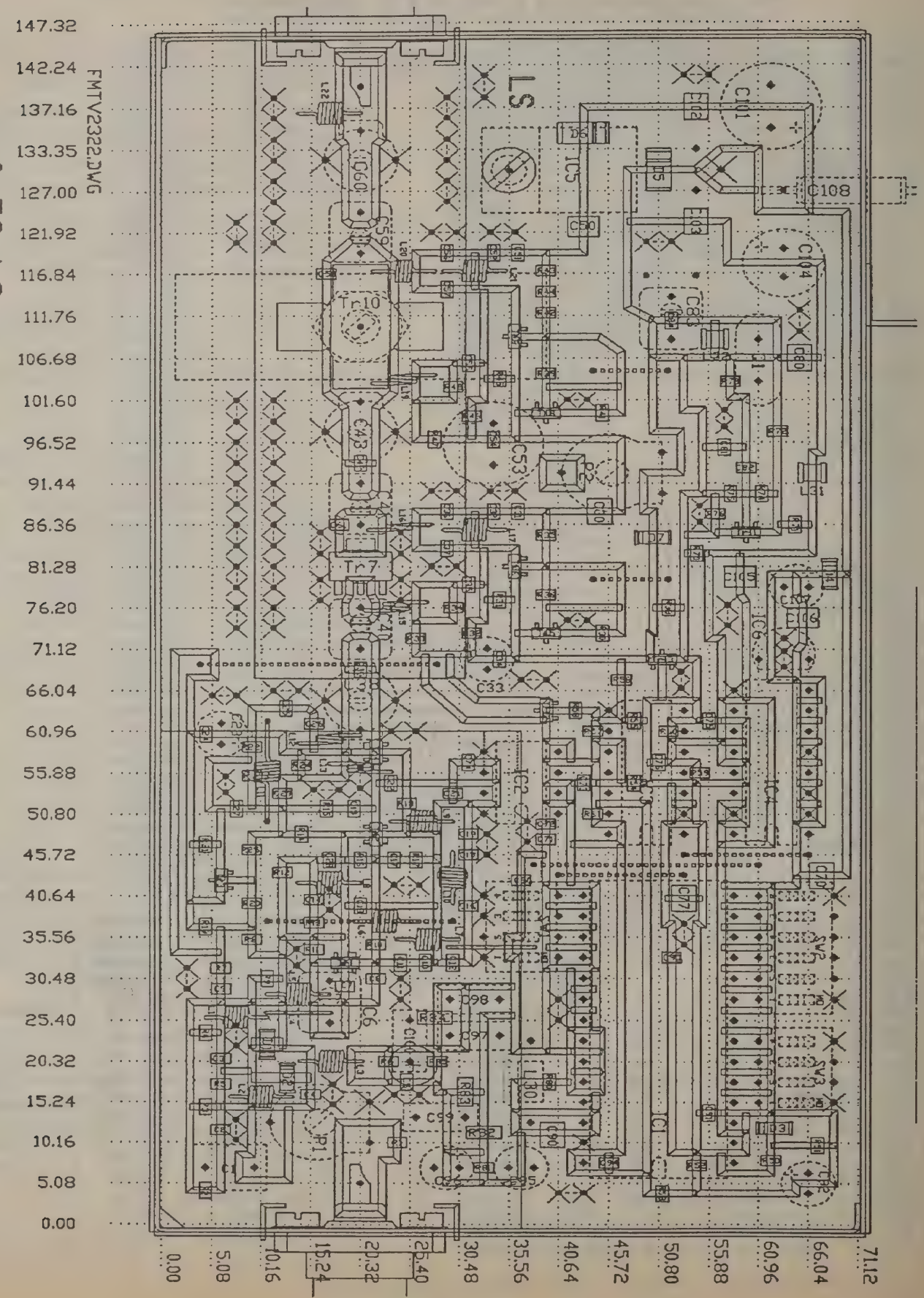
C 11	1n	NP0 Chip 0805
C 12	10n	X7R Chip 0805
C 13	4p7	NP0 Chip 0805
C 14	1n	NP0 Chip 0805
C 15	1n	NP0 Chip 0805
C 16	10n	X7R Chip 0805
C 17	1n	NP0 Chip 0805
C 18	10n	X7R Chip 0805
C 19	1n	NP0 Chip 0805
C 20	10n	X7R Chip 0805
C 21	1n	NP0 Chip 0805
C 22	22p	NP0 Chip 0805
C 23	4u7/50V	50V
C 24	1n	NP0 Chip 0805
C 25	10n	X7R Chip 0805
C 26	1n	NP0 Chip 0805
C 27	10n	X7R Chip 0805
C 28	10n	X7R Chip 0805
C 29	1n	NP0 Chip 0805
C 30	100n	X7R Chip 1210
C 31	10n	X7R Chip 0805
C 32	1n	NP0 Chip 0805
C 33	4u7/50V	50V
C 34	1n	NP0 Chip 0805
C 35	1n	NP0 Chip 0805
C 36	10n	X7R Chip 0805
C 37	1n	NP0 Chip 0805
C 38	6p5	Folientrimmer
C 39	1n	NP0 Chip 0805
C 40	3p5	Teflonfolientrimmer
C 41	3p5	Teflonfolientrimmer
C 42	1n	NP0 Chip 0805
C 43	5p5	Folientrimmer
C 50	100n	X7R Chip 1210
C 51	10n	X7R Chip 0805
C 52	1n	NP0 Chip 0805
C 53	47u/50V	50V
C 54	1n	NP0 Chip 0805
C 55	1n	NP0 Chip 0805
C 56	10n	X7R Chip 0805
C 57	1n	NP0 Chip 0805
C 58	2p2	NP0 Chip 0805
C 59	10p	Teflonfolientrimmer
C 60	5p5	Folientrimmer
Cx 61	XX	NP0 Chip 0805
C 70	100n	X7R Chip 1210
C 71	10n	X7R Chip 0805
C 72	1n	NP0 Chip 0805
C 73	100p	NP0 Chip 0805
C 74	1n	NP0 Chip 0805
C 75	100p	NP0 Chip 0805
C 76	100p	NP0 Chip 0805
C 77	100n	X7R Chip 1210
C 80	100n	X7R Chip 1210
C 81	270p	NP0 Chip 0805
C 82	270p	NP0 Chip 0805
C 83	2-18p	Teflonfolientrimmer
Cx 84	(27p)	NP0 Chip 0805
C 90	100n	X7R Chip 1210
C 91	1n	NP0 Chip 0805
C 92	4u7/50V	105%%d
C 93	10n	X7R Chip0805
C 94	1n	NP0 Chip 0805
C 95	1u/50V	105%%d
C 96	10u/35V	105%%d
C 97	33n	MKT
C 98	33n	MKT
C 99	68n	MKT
C 100	33n	MKT
C 101	470u/16V	85%%d
C 102	100n	X7R Chip 1210
C 103	100n	X7R Chip 1210
C 104	100u/25V	105%%d
C 105	100n	X7R Chip 1210
C 106	100n	X7R Chip 1210
C 107	10u/35V	105%%d
C 108	XXX	Durchführungsfilter
D 1	BB215	Minimelf
D 2	BB215	Minimelf
D 3	PMLL4148	Minimelf
D 4	PMLL4448	Minimelf
D 5	BYM 10-100G	(LL4001) Melf
D 6	BYM 10-100G	(LL4001) Melf
D 7	5V6	Minimelf
IC 1	MC14515P2	
IC 2	SAB6456A	
IC 3	74HCU04	
IC 4	74HC390	
IC 5	LM2940T-8.0	8V/1A/LOW-DROPOUT
IC 6	LM78L05ACZ	5V/100mA
L 1	6Wdg	Cul 0.35mm Spule innen 2mm
L 2	6Wdg	Cul 0.35mm Spule innen 2mm
L 3	6Wdg	Cul 0.35mm Spule innen 2mm
L 4	3/4Wdg	Cul 0.35mm Spule innen 2mm
L 5	6Wdg	Cul 0.35mm Spule innen 2mm
L 6	6Wdg	Cul 0.35mm Spule innen 2mm
L 7	6Wdg	Cul 0.35mm Spule innen 2mm
L 8	6Wdg	Cul 0.35mm Spule innen 2mm
L 9	6Wdg	Cul 0.35mm Spule innen 2mm
L 10	6Wdg	Cul 0.35mm Spule innen 2mm
L 11	6Wdg	Cul 0.35mm Spule innen 2mm
L 12	2Wdg	Cul 0.35mm Spule innen 2mm
L 13	2Wdg	Cul 0.35mm Spule innen 2mm
L 15	2Wdg	Cul 0.35mm Spule innen 2mm
L 16	1Wdg	Cul 0.35mm Spule innen 2mm
L 17	6Wdg	Cul 0.35mm Spule innen 2mm
L 19	2Wdg	Cul 0.35mm Spule innen 2mm
L 20	4Wdg	Cul 0.35mm Spule innen 2mm
L 21	8Wdg	Cul 0.35mm Spule innen 2mm
L 22	6Wdg	Cul 0.35mm Spule innen 2mm
L 30	10uH	Delevan
L 31	10uH	Siemens SMD
Lx 32	XXX	Siemens SMD
P 1	100	
P 2	5k	
Q 1	8.000 MHz	Parallelresonanz Lastkap. 32p
R 1	300	Chip 0805
R 2	15k	Chip 0805
R 3	100	Chip 0805
R 4	100	Chip 0805
R 5	100	Chip 0805
R 6	100	Chip 0805
R 7	1k5	Chip 0805
R 8	2k7	Chip 0805
R 9	100	Chip 0805
R 10	56	Chip 0805
R 11	‹330›	Chip 0805
R 12	15k	Chip 0805
R 13	6k8	Chip 0805
R 14	46k8	Chip 0805
R 15	12k	Chip 0805
R 16	33	Chip 0805
R 17	‹150›	Chip 0805
R 18	330	Chip 0805
R 19	10k0	Chip 0805
R 20	2k7	Chip 0805
R 21	1k2	Chip 0805
R 22	1k2	Chip 0805
R 23	1k2	Chip 0805
R 24	100	Chip 0805
R 25	‹33›	Chip 0805
R 30	4k7	Chip 0805
R 31	1k2	Chip 0805
R 32	1k2	Chip 0805
R 33	820	Chip 0805
R 34	100	Chip 0805
R 35	‹18›	Chip 0805
R 36	10k	Chip 0805
R 37	22k	Chip 0805
R 38	470	Chip 0805
R 39	4k7	Chip 0805
R 40	12k	Chip 0805
R 41	2k7	Chip 0805
R 42	22	Chip 0805
R 43	22	Chip 0805
R 44	18	Chip 0805
R 45	220	Chip 0805
R 46	220	Chip 0805
R 47	220	Chip 0805
R 48	22	Chip 0805
R 50	33k	Chip 0805
R 51	3k3	Chip 0805
R 52	39k	Chip 0805
R 53	100k	Chip 0805
R 54	1M	Chip 0805
R 55	4k7	Chip 0805
Rx 56	XX	Chip 0805
R 57	4k7	Chip 0805
Rx 58	XX	Chip 0805
R 59	33k	Chip 0805
R 60	33k	Chip 0805
R 61	33k	Chip 0805
R 70	47	Chip 0805
R 71	100	Chip 0805
R 72	6k8	Chip 0805
R 73	1k8	Chip 0805
R 74	47	Chip 0805
R 75	33	Chip 0805
R 76	330	Chip 0805
R 80	100k	Chip 0805
R 81	10k	Chip 0805
R 82	2k87 (2k94)	Minimelf
R 83	2k87 (2k94)	Minimelf
R 84	1k47	Minimelf
R 85	15k	Chip 0805
SW 1	DIL-SW	AR K40-4S
SW 2	DIL-SW	AR K40-6S
SW 3	DIL-SW	AR K40-4S
Tr 1	BFP183	SOT-143
Tr 2	CF739	SOT-143
Tr 3	BCW30	SOT-23
Tr 4	BFP183	SOT-143
Tr 5	BCW32	SOT-23
Tr 6	BCW30	SOT-23
Tr 7	BFG19S	SOT-223
Tr 8	BCW32	SOT-23
Tr 9	BC807-40	SOT-23
Tr 10	BFQ34	SOT-122
Tr 11	MMBR5179	SOT-23
Tr 12	BSS138	SOT-23
Tr 13	BSS138	SOT-23

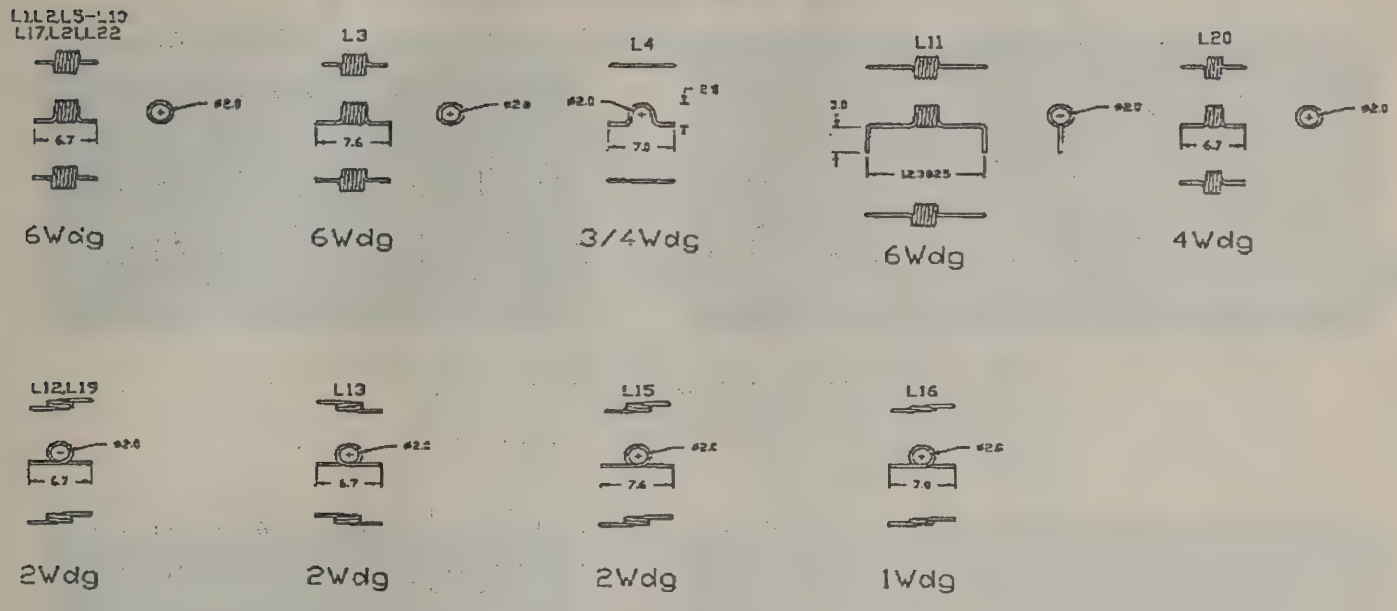


Einbauposition von Print in Gehäuse

24 CM ATV TRANSMITTER



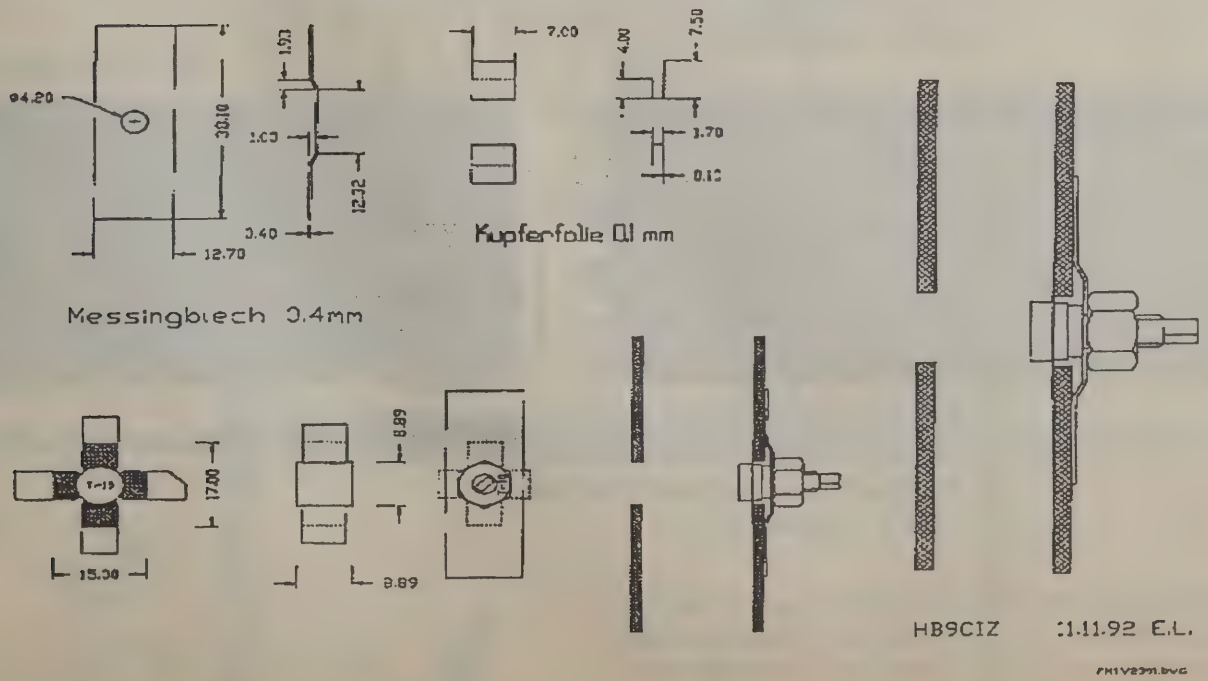
Spulen für den FM-ATV-Sender



Alle Spulen Draht CUL Ø0.355 HB9CIZ 27.10.92 E.L.

FMTV2351.DWG

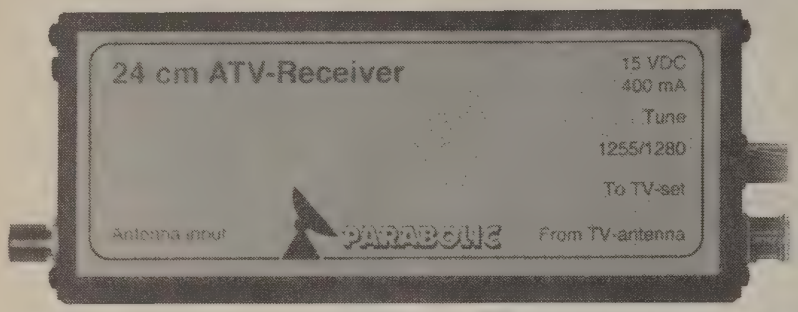
Einbau des Endtransistors

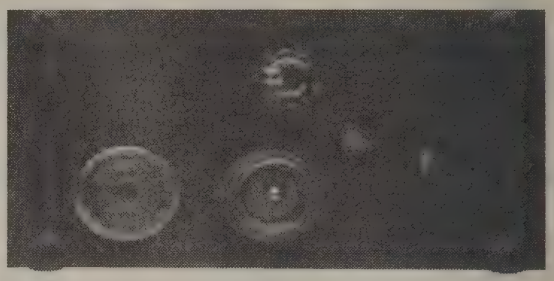


NEW GENERATION OF 24 cm FM-TV

Get linked with near broadcast quality.

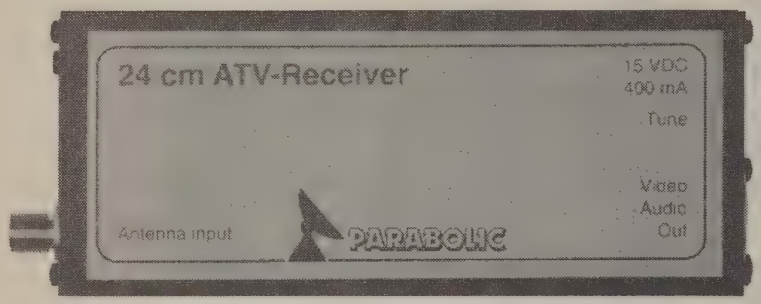
65 x 35 x 160 mm





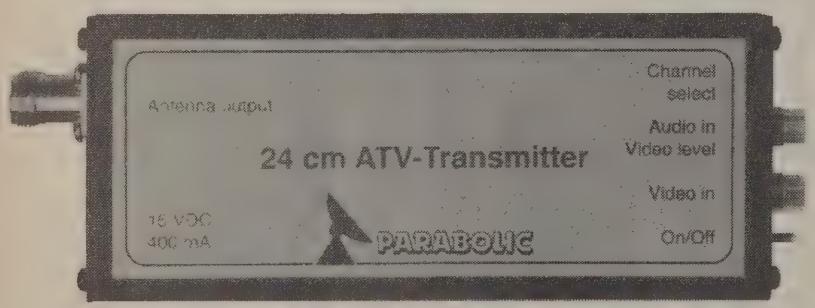
The world's smallest satellite receiver with modulated output on 48.25 MHz with audio on 53.75 MHz. (European use only).
$179 + shipping $12.

65 x 35 x 160 mm



Same receiver with Video and Audio outputs.
Will tune approx. 1200 to 1500 MHz.
Both receivers deliver voltage for a preamp through the coax cable.
$179 + shipping $12.

65 x 35 x 160 mm



200 mW FM-transmitter that tunes between 1240 and 1279 MHz in 1 MHz steps. Will drive the M57762 to about 10W. One year guarantee.
$249 + shipping $12.

All modules use 15VDC max 400mA (incl. preamp) but 13.8VDC is OK. The transmitter will work as low as 10VDC. A preamp with 1,0dB NF and 40dB gain is also available at $169.
Buy both receiver and transmitter and we ship free.

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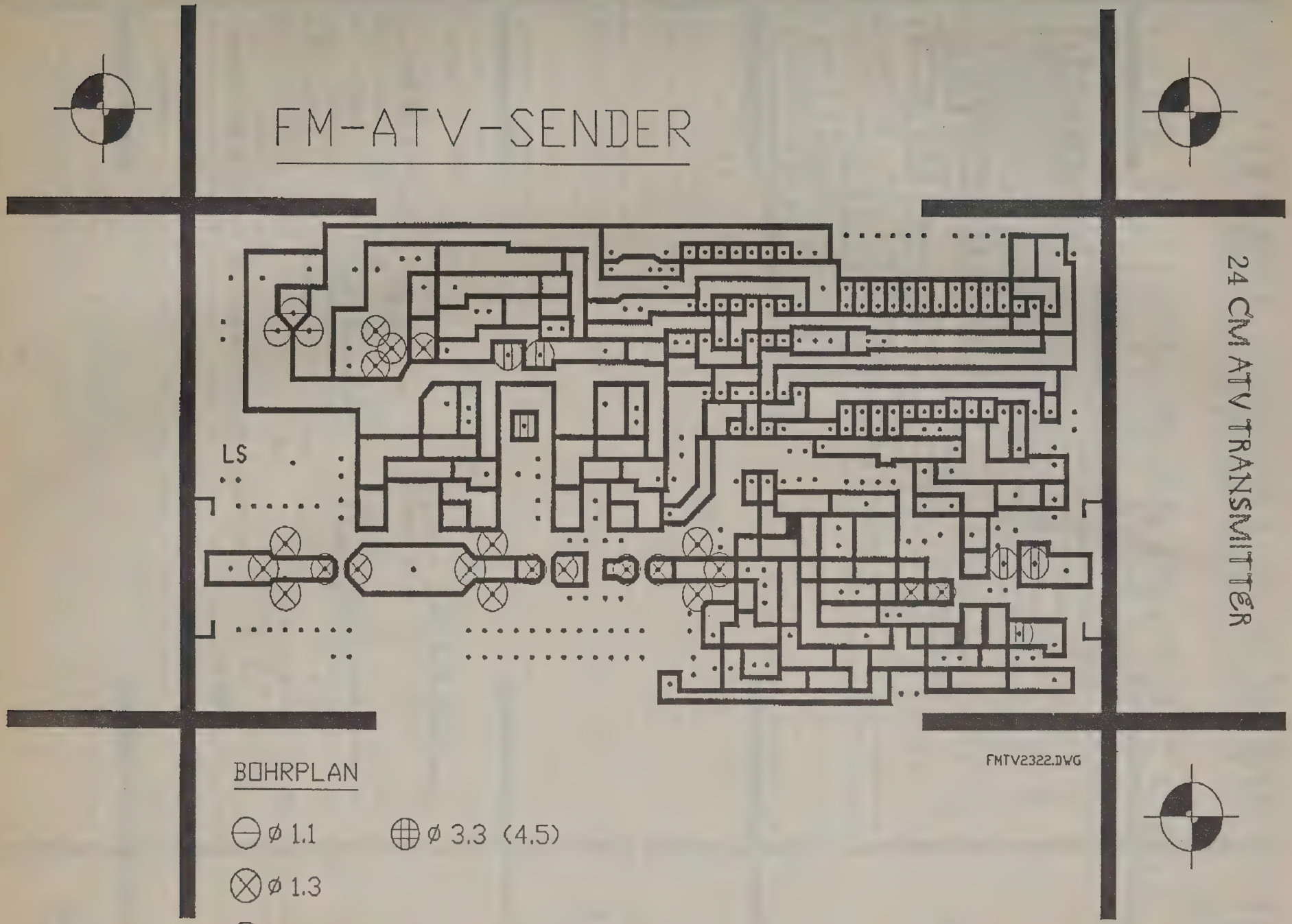
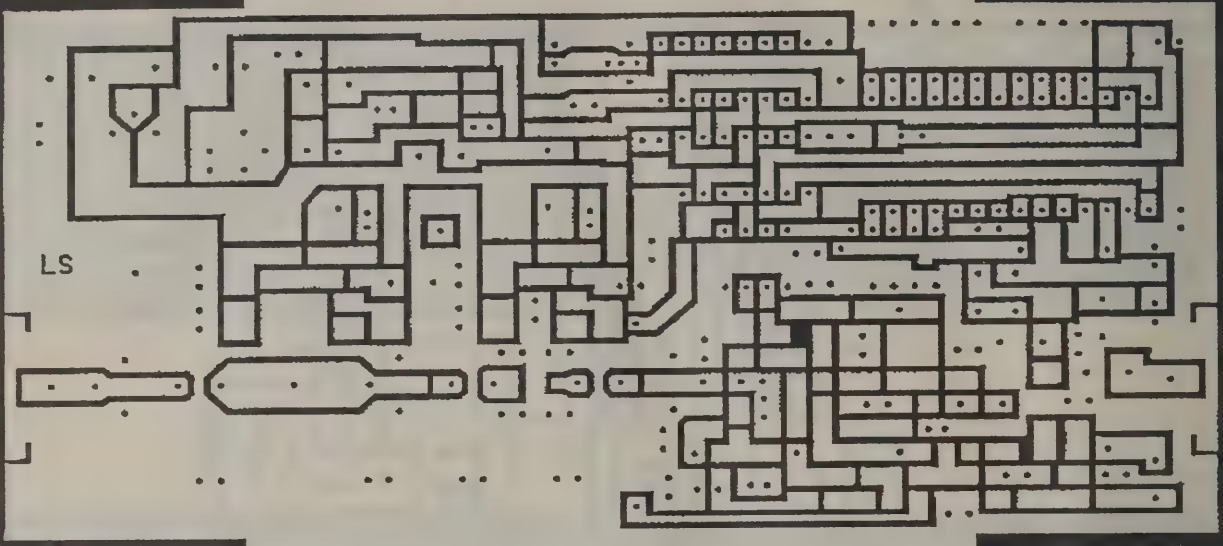
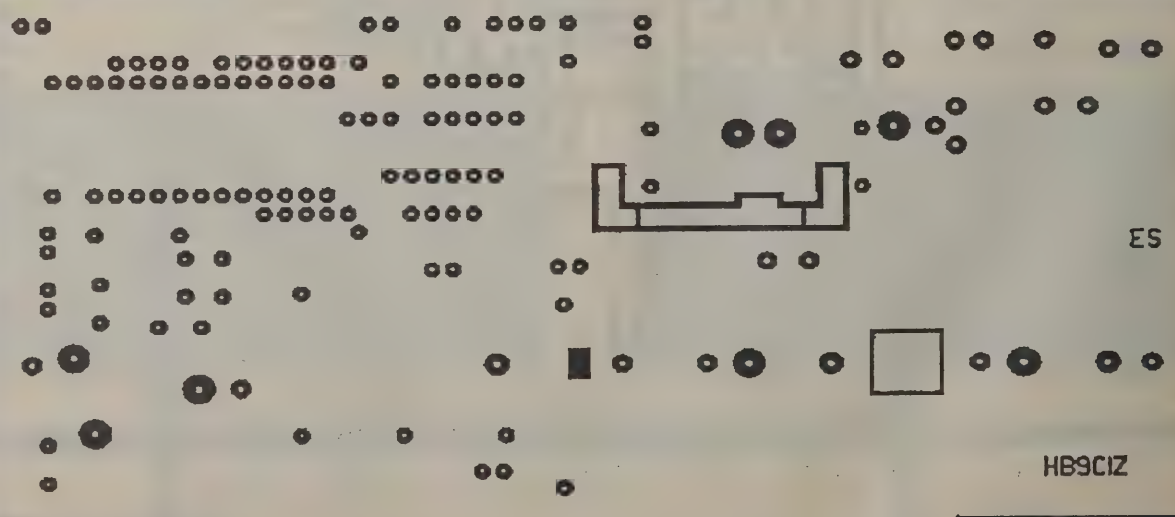

FM-ATV-SENDER
24 CM ATV TRANSMITTER
LS
FMTV2322.DWG
BOHRPLAN
ø 1.1
ø 1.3
ø 1.4
ø 3.3 (4.5)
nicht bezeichnete Bohrungen ø 0.8

24 CM ATV TRANSMITTER



NEGATIV



NEGATIV

ATV CONTROLLER WITH NO MICROPROCESSOR

A simple ATV repeater can be controlled quite well using relay logic, but systems that need to vote on more than two inputs require a different approach. So, if you want to build your own and don't want to incorporate a processor, here is a scheme for a very reliable and flexible controller with four channels.

The East Texas Amateur Television Group has linked repeaters at Kilgore and Tyler, Texas. Also linked is the North West Louisiana ATV repeater at Shreveport. The middle repeater controller at Kilgore needed multi-channel capability to handle the FM micro links coming from East and West. We built this controller which has been operating now for two years with no hitches or glitches.

In designing the controller, I first thought of the 4066, a four channel analog switch. If video sources (receivers) were fed to the inputs, outputs tied common, then sequential gate the chip, I had a scanner or voter. Just tie a VOR to output and when it sensed video the sequencing could be halted, transmitters keyed and the video on that channel repeated.

Next step, digital logic was needed that would 1 of 4 sequence,..to provide the signals to gate the 4066. I chose the scheme provided by Forrest M. Mimms III Radio Shack's Engineer's Mini-Notebook on digital logic circuits, page 42. (the 4066 scheme is also shown in this notebook on page 41) This scheme uses a 555 timer to clock a 4013 flip flop which provides logic to a 4001 resulting in the 1 of 4 sequencing. All I needed to do was un-key the timer when the vor was active so that sequencing would stop. This is done by grounding pin 2 of the 555 through the vor relay which provides ground path for all transmitter keying as well. Note: A spdt switch may be incorporated with the 4013 causing it to only scan channel 1&2, if two channels are sufficient. Later on you may want to add a link or two ...just flip the switch and scan all four.

The 4066 does require inputs at DC potential to avoid video bleeding between channels within the switch. As always, terminate your video inputs to 75 ohms, tap the video above the termination with a 47mf cap, provide DC potential through a 10k resistor, allow this potential to feed through the 4066, and bias the video distribution amplifiers first transistor which has to be done anyhow. The video distribution amplifier we use is found in ATVQ Vol 3 #1, page 56, fig 4. The Id timer can be taken from a Vor 2 or built separately. We built our vor from PC scheme and timer out of another Mimms scheme on pg 10, "Notebook on 555 Timer IC Circuits". The reason, only so everything was on cards....but, you could put Tom's vor on a card. I'm not sure of what options the VOR-II has....we wanted the timer to reset only when it saw activity.

The decoder we use is in the ARRL Handbook. The scheme we use incorporates flip flops, switching transistors, and push button switches. Functions of the controller may be performed from the front panel or remote. Key on, the same key again keys off, allowing sixteen functions. We have control of the following: Repeat, Scan stop, Channel lock outs, Audio enable, Id, Change Id picture, and turn on remote camera.

The Controller, Decoder, Timer, VOR and VDA are built using the point to point method on three radio shack plug-in boards, Cat no 276-154A.The front and rear panels of this project are pretty busy with a lot of led's, switch's, push buttons, and connectors. So, when making the front and rear panels try this: draw, block, decorate, and label the panels using your word processor or Edraw program. Next, place some white contact shelf paper in your printer (it comes in just the right width rolls). Make two copies of each, one for construction and the other for finish. Last, on the finish copy, cover with one of the clear plastic stick on films to protect from smudging the ink. Just peal the back of the shelf paper and stick on the panel for a drilling template and finished panel that looks great!

If you want a copy of my schematics, I can provide either hard copy or disk with the shareware program "Edraw."

Finally, I would like to acknowledge; the craftsmanship of James Fall K5JF who took my drawings and turned them into hardware. Also, PC Electronics, ATV Quarterly, ARRL Handbook, and Radio Shack for ideas and circuits. Of course, to ATV... a great mode!

Arlyn Stewart AA5BY 101 S. Stewart St. White Oak, Tx. 75693 (903) 297-2289

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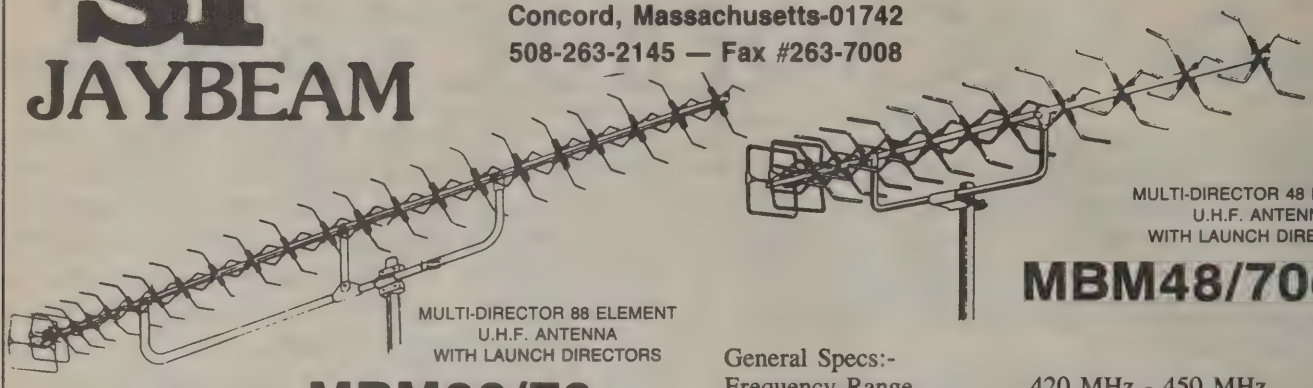

MULTI-DIRECTOR 88 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM88/70cm

MULTI-DIRECTOR 48 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM48/70cm

General Specs:-

Frequency Range	420 MHz - 450 MHz
Impedance (Built-in Balun)	50 Ohms

MULTI-DIRECTOR 28 ELEMENT
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM28/70cm

	MBM48	MBM88
Gain	14.0dBd	18.5dBi
Beamwidth (E)	28 deg	23 deg
(H)	35 deg	28 deg
Boom Length	6 ft	13 ft
	$ 115.00	$ 160.00

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KNOCK OUT INTERFERING
QRM OR SELF-DESENSE!

BNC Standard
TNC or Type 'N' optional
(slightly higher prices)

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The PSf . . . ATV series of TV Channel Filters are 5 pole, 6 MHz bandwidth designs. They are used to protect your TV receiver from inband QRM and to "strip-off" the unwanted sideband of your transmitted vestigial sideband signal.

Model	PSf144	PSf220	PSf432	PSf900	PSf1296	PSf1691
Freq (MHz)	140-150	216-228	420-450	890-940	1250-1340	1650-1750
Loss (typ)	0.1 dB	0.1 dB	0.15 dB	0.2 dB	0.25 dB	0.25 dB
	$200.00	$160.00	$105.00	$125.00	$125.00	$125.00

Model	PSf421-ATV	PSf426-ATV	PSf439-ATV	PSf910-ATV	PSf1253-ATV
Loss (typ)	2.0 dB	2.0 dB	2.0 dB	2.5 dB	3.0 dB
Std conns.	BNC	BNC	BNC	N	N
	$155.00	$155.00	$155.00	$180.00	$180.00

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• January 5, 1994 • For Immediate Release

NewsRelease

Florida Ham Launches Massive Antenna Lawsuit Against Condominium Association, Prepares Bill For Florida Legislature.

MEDIA CONTACT

■ **Richard Heiden, Esq.**
Kimpton, Burke & White
28059 US Hwy. 19 North
Clearwater, FL 34621
Fax (813) 796-0909
Phone (813) 791-0063

Condominium Association Lawsuit

Clearwater, Florida—After trying for almost three years to install and maintain an Amateur Radio antenna, Don Stoner, W6TNS, has initiated a lawsuit that could have significant impact on hams in other areas of the country.

Many condominiums and community associations have restrictions on antennas, called restrictive covenants. Usually they specify that no antennas be erected, which covers ham radio as well as satellite dishes.

The suit, which contains 11 counts, 142 paragraphs and weighs almost four pounds, was initiated on January 30, 1993, against the defendant, 440 West, Inc. Stoner maintains in the lawsuit that the Association has installed community television antennas, and a radio system for condominium security, in direct violation of their own rules.

Stoner maintains the action of 440 West, Inc., has violated his *civil rights and freedom of speech*. W6TNS alleges that as a result of the actions of the Association, he is no longer able to talk with his friends, made as a ham radio operator in the past 40 years. He further alleges the restriction the Association relies on, for its right to ban ham radio, specifically applies to *television antenna* and nothing else. Stoner was forced to take down a longwire antenna even though there was no restriction against a receiving antenna in the Association documents.

In an unusual approach to resolving Association concerns about multiple antennas, Stoner offered to install a *community ham radio antenna*, incorporating the AEA, Inc., "*Hamlink*," stating that any licensed resident could use the system without adding any wiring or other antenna. The Association refused this reasonable offer and the lawsuit was initiated.

If W6TNS wins this lawsuit, it could impact the situation of other hams throughout the country. Many condominium associations, planned communities and mobile home parks have restrictive covenants and/or deed restrictions which attempt to restrict the activities of Amateur Radio operators in every state of the nation.

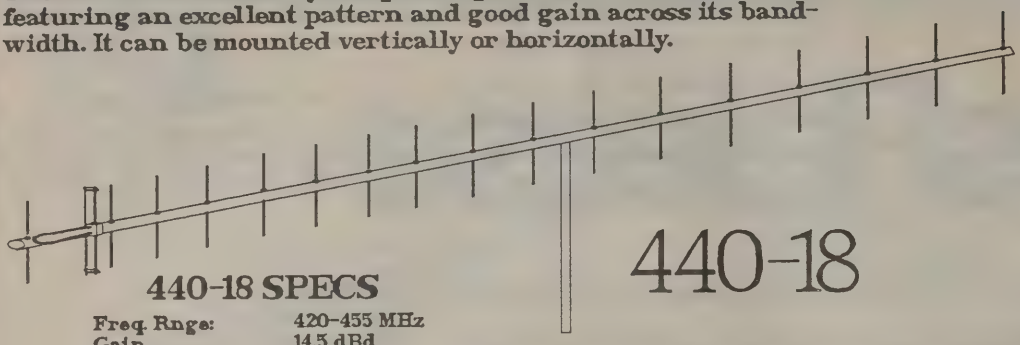
Antenna Legislation

To provide a more complete solution to the restrictive covenant problem, Stoner also is working with Florida legislators to introduce ham radio provisions, that would benefit all Amateurs, into the State law. Don Stoner, W6TNS, who is the President of The National Amateur Radio Association, believes that restrictive covenants work against the safety of the entire community and should be revised. Recently, Florida residents had a painful, first-hand example, when hurricane Andrew devistated the southern end of the state.

The legislation proposed by Stoner requires that each condominium, planned community, and mobile home park be required have an *emergency preparedness plan*, which includes ham radio. If an Amateur lives in one of these communities, he or she would be allowed by law to install an antenna system suitable for providing safety communications to the community.

For additional information, contact Richard Heiden at the address shown. Heiden is the attorney of record in Stoner's suit and directs legislative efforts in the State of Florida.

The 440-18 is a carefully computer optimized broadband yagi featuring an excellent pattern and good gain across its bandwidth. It can be mounted vertically or horizontally.



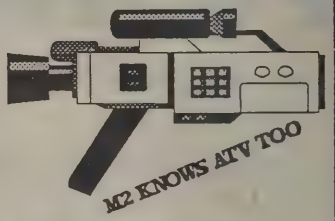
440-18

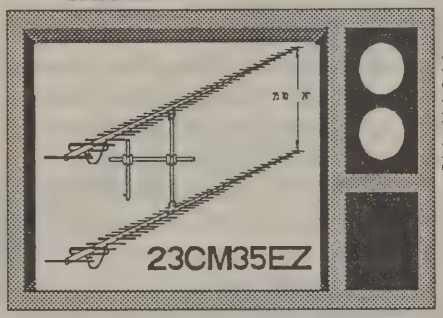
440-18 SPECS

Freq. Rnge:	420-455 MHz
Gain	14.5 dBd
Frt to bck.	23 dB
W. Area	.875 sq. ft.
Boom Lg	11.33 ft.
Trn Rad.	6 ft.

OTHER ANTENNAS OF INTEREST FOR ATV USE!

420-450-11
420-5-5
432-9WL





23CM35EZ SPECS

Freq. Range	1250 to 1300
Gain	18.4
Frt to Bck	25 dB
W. Area	0.6 Sq. Ft
Boom Lng	120 in
Trn. Rad	6 Ft.

ATV

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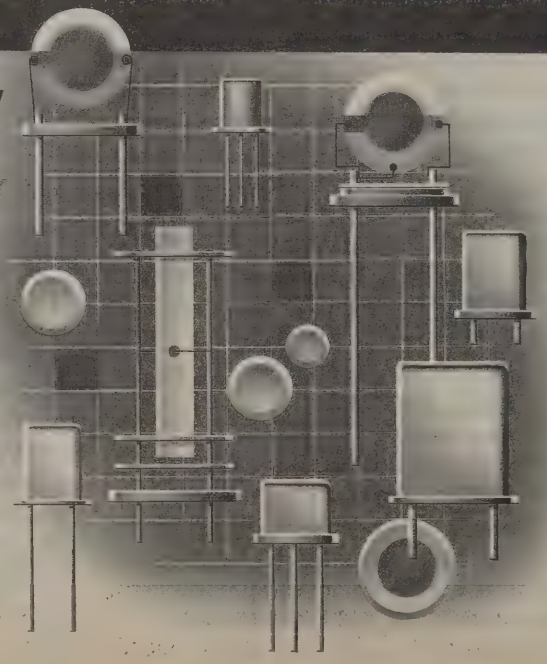

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The w6ORGy Notes

By Tom O'Hara, W6ORG

IF IT'S APRIL, IT MUST BE DAYTON

Yes, the last weekend in April is the annual feeding frenzy for hams. Piggy (ham) banks will be broken in anticipation of getting a good deal on a necessary addition to the shack (yes, new toys are necessary). There will be more Forums and booths than you can possibly attend or see in the three days plus running into and swapping lies with old and new friends. Maryann and I will be in the same booth, #355.

This rite of spring has been going on for a long time. The Dayton Amateur Radio Association could probably write a best seller on how to organize and run an amateur convention. But can it continue to be the same outstanding event year after year?

Rising costs may slowly erode this great event. This year DARA says that they wont be able to afford busses to and from the hotels and people will have to pay for parking out in the fields (and a tow truck if it pours like one year). 73 Magazine stopped renting a booth last year after they analyzed what their total costs were verses sales. I know we are happy to break even every year and count on follow on sales to make any thing. So if you buy a new rig, please go home and tell everyone that they have to get one too!

The exhibitor booth rentals are up to $450. A telephone installed just for the 3 days in order to quickly call in charge cards is a whopping $176. Add in shipping, drayage, hotel rooms, air line tickets, car rental, and meals plus the fact that everyone expects Hamvention special prices and the 6.5% Ohio sales tax thrown in by exhibitors for cash sales; there ain't nut'in left for *me* to bring home any new toys.

So I think this years Dayton will be the best shot at good deals on new gear. More and more exhibitors may find that given the increasing costs of both hamventions and government mandated regulations and taxes, it makes less and less business sense to go to hamfests or as an alternative, have to raise prices to cover it all. I say buy that new piece of gear this year because you will pay much more next year if you don't.

ALL YOUR QUESTIONS WILL BE ANSWERED

At this years ATV Forum, I'll attempt to present all the most asked ATV questions I get plus those from the floor. Some of them include: mods to the Mirage amateur amps and others to make them work for AM video and why. The Bird wattmeter readings with video - PEP, average, blanking and other mysteries. The amateur AM vs. FM ATV comparisons that have taken up the last 3 ORGy Notes. ATV sensitivity - if one preamp is good why doesn't 2 or 3 suck every signal out of the air? How far does ATV really go? How do you ID on ATV and legal limitations?

In addition *Bill Parker, W8DMR* and *Ken Morris, WA8RUT* will discuss the technical details of the Columbus Ohio ATV repeater. This machine incorporates both an AM and a FM video input, horizontal and vertical polarity, link and crossband output plus secondary audio and control from two meters. Something for everybody.

WE LOST 220, NOW IT'S 2.4

The NTIA, the giver of all bands, is expected to give 2404 to 2417 MHz to the FCC for commercial use as early as August of this year. This affects us in the high density areas right now, and the rest of you later. Very little was said when we lost 2310 to 2390 because few people new about it or cared. That was the beginning which signaled the NTIA and those looking for spectrum that Amateur frequencies were ripe for the picking.

Here in Southern California, we are on 2.4 GHz ATV now with an FM input to the Santiago repeater. The 434 primary input is often trashed by radar and other amateurs who don't know the band plan. So in order to have a clean input, especially for public service events (the only thing we have not had yet is locusts), an input on 2441.5 was put up. It was soon found that this frequency was over loaded by a broadcast remote truck monitor out put on the adjacent channel at 2458 MHz at the same mountain. So the only other alternative on that band is to go to 2418.5 MHz, but that is not possible if the FCC takes it. The 400, 900 and 1200 MHz bands are full for ATV here and would not support another AM ATV input let alone a FM one.

HF Technology now has stock on their 1 Watt FM transmitter for 2.4 GHz, and another company is working on one. Cost of ATV transmitters may not be as high as one might expect for this microwave band because of the parts being made for spread spectrum digital and video part 15 devices. In fact the amateur transmitters use power modules made just for that service.

This band is excellent for linking and repeater outputs too. Downconverters and dishes made for MDS service at 2.1 GHz or IFTS at 2.5 GHz are made in quantities that bring the price way down. Check out the Phillips Tech catalogue (602-947-7700) for instance.

If you are on 2.4 GHz or intend to be in the near future, at least go on record in opposition. *Paul Rinaldo, W4RI*, at the ARRL seems to know the most about it according to what he wrote in the ARRL Letter. I suggest writing to him at ARRL HQ to let him know your feelings. If the file is empty of opposition to reallocating ham frequencies, those that have to allocate the resources will give them to those that do. One day when your area gets as crowded as Southern California, you will wish you mailed that letter today.

The band plan was changed to reflect the original loss of 2310-2390 and now if we lose 2404-2417 we'll have to do it all over again with less room for wide band modes such as FM ATV, high speed digital as well as all the others.

ONE MICROVOLT ANYONE?

From tests I have made, an interfering signal in the ATV passband of 1 uV is acceptable. The ARRL bandplan over laps FM voice repeaters and digital in the normal ATV passband. Technically this is not a responsible thing for a coordination council to do both under the good amateur practice and non interference with an existing signal rules. But given enough geographical separation, power, polarity, etc. it is possible if a acceptable level is known.

73, Tom O'Hara, W6ORG

P.C. ELECTRONICS 2522 PAXSON LANE ARCADIA CA 91007-8537 USA
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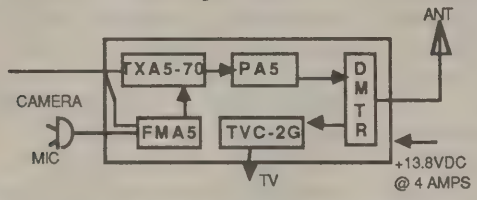
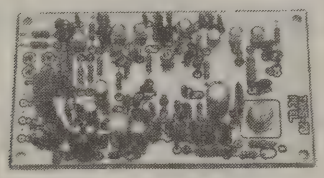
ELECTRONICS

BUILD YOUR OWN 10 WATT ATV STATION

Basic 10 Watt system - 3 Transmitting modules as seen in the Handbook



See chapters 20 & 7 in the *ARRL Handbook*. These modules are the latest upgraded generations. Mount the boards & parts for a 10 to 15 Watt basic module ATV transceiver in a 3x8x12" aluminum chassis for shielding and heat sinking. Use the DMTR module to switch 50Ω 70cm antenna between PA5 amp & downconverter. See the TVC-2G Downconverter module [illegible] Schematic & layout comes with each module.



TXA5-70A 4.0"x2.25"

TXA5-70a ATV EXCITER/MODULATOR.....$89
Replaces TXA5-5. Smaller board for stand alone portable or R/C applications in addition to 10 Watt systems. Wired and tested board. Adjustable 50-80 mW output to properly drive the PA5 10 Watt and 100 Watt power amps. Accepts standard 1 volt composite video from color camera, VCR, computer, etc. Wideband modulator gives excellent color and high resolution. Built-in sync stretcher, Draws 70 mA at 13.8 Vdc. One crystal included, but relay switch between 2 sockets. **Extra crystal $15.** We stock 439.25, 434.0, 427.25 & 426.25 MHz, other 70 cm freq. may take 4 weeks to special order xtal. 100 Ohm carbon panel pot for video gain **$5.**

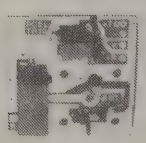
PA5 3.5"x2.0"

PA5 10 WATT P.E.P. ATV POWER MODULE.....$99
An all mode Toshiba S-AU4 is mounted on a heatsink with a stripline PC board to output over 10 Watts p.e.p. when driven by 80 mW from the TXA5-70. 50 Ohms in & out. Broadband, 420-450 MHz, linear, no tuning. 250 mW max RF input, do not use with 1 Watt modules. req. 13.8Vdc reg. @ 3 amps.

FMA5-F 3"x1.5"

FMA5-F AUDIO SUBCARRIER GENERATOR.....$39
Temperature stablized VCO with adjustable deviation to more than 25 kHz. Transmits broadcast standard sound with your picture. Accepts a Low Z mic (100-600 Ohms), also line level audio from VCRs, camera mics, computers, etc. Up to 1 v pk-pk drive to the TXA5-70, TXA5-RC or TXA5-33 exciter modulators. Works with any transmitter having 5 MHz modulation bandwidth. Draws 20 ma from 13.8 Vdc supply.

2.2x2.2"



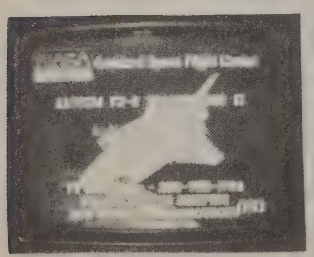
TR-10 2 x 2"

DMTR-70-10 T/R RELAY, DETECTOR & MONITOR.....$45
T/R switching for up to 15 Watt 70cm ATV systems. Negligible insertion loss, 60dB isolation. Mounts on flange type UG58 N chassis jack ($2). Relays for switching + power to all basic modules, camera video in rec. to detected output video in xmit. to monitor. 2.2x2.2". 13.8Vdc @ 120 ma.

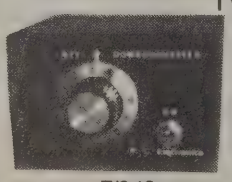
TR-10 70cm T/R RELAY BOARD.....$29
Simple RF T/R relay and up to 1A +13.8 power relay. also has RF test point.

420-450 MHz ATV DOWNCONVERTERS

GET STARTED WITH ONE OF THESE TO *SEE* THE ACTION!

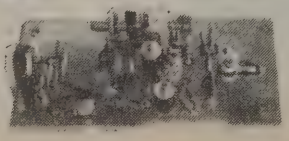


Space Shuttle video



TVC-4G

TVC-4G PACKAGED DOWNCONV. with AC supply.....$89
Contains the sensitive TVC-2G board in a black die cast 4.7x3.7x2.1 inch aluminum box ready to go with 120 Vdc 60 Hz to 12Vdc 100 ma. wall plug power supply. N connector antenna input and F output to TV. Companion downconverter to our TX70-1b transmitter and other TX boards. TVC-4G is handy for ATV portable, mobile, demos, or getting a friend on. Also used in community pay TV systems outside USA.



TVC-2G 2"x4"

TVC-2G GaAsFET TUNEABLE DOWNCONV. BOARD.....$49
Wired and tested module connects between 70cm antenna and TV set tuned to channel 2, 3, or 4 (special order 45.75 MHz IF or LVSB). Varicap tunes whole 420-450 MHz 70CM amateur band. Sensitive 1 dB NF dual gate GaAsfet used in both the preamp and mixer stages. 25 dB gain. Requires +11 to 18 Vdc @25 mA , shielded enclosure, knob, 10K pot, switch, fuse and connectors.

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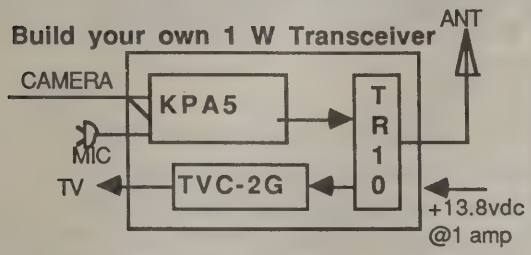
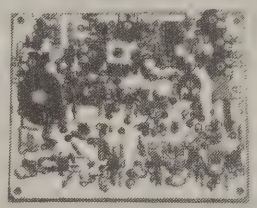
THE "KREEPIE PEEPIE" ATV TRANSMITTER

THIS IS THE ATV TRANSMITTER BOARD YOU HAVE READ ABOUT THAT HAS SURVIVED MANY BALLOON FLIGHTS TO OVER *100,000 FEET* AND BACK. ALSO USED FOR R/C MODELS WHERE AN ALL IN ONE BOARD WITH SOUND IS DESIRED OR DEDICATED LINKS AND REPEATERS. JUST THE THING FOR THE BUILDER WHO WANTS TO PACKAGE AND MAKE HIS OWN PORTABLE 70 CM ATV TRANSMITTER OR HOME TRANSCEIVER WITH A WIRED AND TESTED BOARD.





KPA5-F board only $169

KPA5-F 70CM ATV XMTR BOARD FEATURES:

- 1.5 Watts P.E.P. typical RF output. Run barefoot for portable, but if needed for greatert DX, the output properly matches the Mirage D15N 15 watt, D26N-ATV 50 Watt linear amp for full output or D100TVN to over 70 Watts with its adjustable sync stretcher. Same board as used in TX70-1b.
- FULL COLOR AND SOUND on a small 3.25 x 4" board
- Wired and tested board runs on external 13.8 Vdc @ 300 mA. supply or 12 V battery. Weighs only 3 oz.
- Accepts composite video from cameras, camcorders, VCRs, computers, etc. 2 audio inputs, one for low Z dynamic mic, & one line level from most cameras & VCRs. Transmit monitor output enables seeing your own true RF detected video.

KPA5 APPLICATION:

PORTABLE CORDLESS TV CAMERA. Think of it as a video HT. Place the KPA5 in one of the L.M.B. Diecast aluminum boxes, AEA HR-4 half wave "hot rod" on top or at the end of 50Ω coax attached to a headset. Plug into a 12-14 v source such as a 12 Vdc battery pack. Depending on terrain & receiving antenna DX is typically over 1 mile. Then at home with Rutland FO22-ATV antennas at both ends DX is >22 miles snow-free line-of-sight.

Price only $169 supplied with one crystal on 426.25, 434.0, 427.25 or 439.25. 2nd xtal add $15. Has 2 relay switched crystal sockets. Specify frequency(s) when ordering, check with local ATVers, ARRL Repeater Directory or call us. Sold only to code free Technician class or higher licensed radio amateurs.

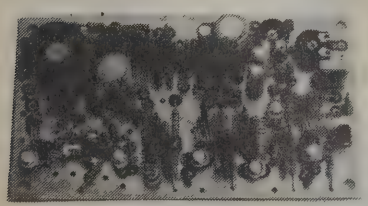
ACCESSORIES:

L.M.B. CAB247 7.3x4.7x2" roomy aluminum box.....**$20**
CAB234 4.6x3.6x2" aluminum box, smaller tighter fit.....**$13**
100 Ohm carbon panel pot for video gain control.....**$5**
TR-10 RF T/R relay module, mounts on chassis N conn.....**$29**
TVC-4G..$89 or TVC-2G..$49 Downconverter (pg 5)
RG174 50 Ohm 1/10 inch dia. coax cable, 6ft.....**$3**
MIRAGE D15N-ATV 1.5 in /15 out all mode amp.....**$176**
MIRAGE D26N-ATV 1.5 in / 50 out all mode amp.....**$249**
MIRAGE D100TVN 1.5 in/70 out all mode amp.....**$364**

AEA HR-4 "Hot Rod" half-wave portable antenna.....**$24**
450 ISOPOLE omni 4 dBd vert. gain antenna.....**$89**
KLM 440-6X 8.9 dBd ant., 28" boom, >50 deg. BW.....**$60**
KLM 440-10X 11.2 dBd, antenna, 64" boom.....**$74**
RUTLAND FO22-ATV 15.8 dBd antenna, 14 ft boom...**$115**
UG21 type N male connector for Belden 9913 coax.....**$5**
UG58 N female flange type chassis connector.....**$2**
800J 10 pin VHS color camera chassis connector.....**$10**
800P 10 pin VHS color camera cable male plug.....**$15**

SMALL TXA5-RC 1 WATT ATV TRANSMITTER.....$129

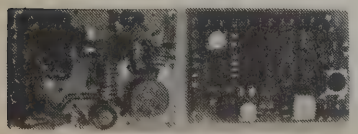
Designed primarily for Radio Control models, rockets, balloons, etc. with it's small 2.25 x 4 inch size and 2 oz. weight. Adjustable power output from 1.5 p.e.p. to 100 mW. Draws 350 MA @ 13.8 Vdc and 1 Watt, 200 ma at 100 mW. Has adjustable sync stretcher and provisions for sound from the FMA5-F board (pg 2) in case your application needs higher power sometimes or subcarrier sound. Comes wired and tested ready for you to mount in a shielded enclosure, connect up coax from antenna and camera and wires to power source. Plan on shielding your R/C receiver and adding the simple antenna low pass filter supplied with the application note. Receive with one of our 70 cm downconverters listed on page 5 and a TV set. Specify freq., 426.25 MHz suggested for R/C, other standard ATV freq. avail.



TXA5-RC 2.25 x 4"

See page 8 for mini cameras

TXA5-70a board can also be used for R/C applications where 2 frequency capability is desired. Same size as TXA5-RC but 80 mw.for .25 to 5 mile DX, or add 10 Watt PA5 amp for 3 to over 100 mile line of sight DX. See page 2....**$89**



ATVM-70 Transmitter MSC-2 Sound

MICROTEK ATVM-70 MINI ATV transmitter board.....$129
Only 1.0 x 1.3 inch, wired and tested board. See article in July 91 73 Magazine page 9. Nominal output 80 mw. Capable of driving the PA5 for higher power. Requires 7.0 to 10.0 Vdc maximum at <100 ma. Only 434.0 MHz is available with the SAW oscillator. Also Great for R/C models, robots, demos or short links. Snow free line of sight DX1/4 mile dipole to dipole or up to 5 miles with Rutland FO22-ATV antennas.
MSC-2 companion 4.5 MHz sound subcarrier board, same board size as ATVM70.....**$59**

PRICES INCLUDE UPS SURFACE SHIPPING, VISA / MC - NO HIDDEN COSTS. 3/94
Hams, call now for our complete 10 page ATV catalogue.

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Important News for Pasokon TV users

Radioware now stocks the ColorEyes/RT video capture board for use with your Pasokon TV Slow Scan adapter and PC/AT compatible computer. This board can be used to **capture "live" video frames** from any NTSC (a PAL version is also available) source including, Video Camera or Camcorder, Video Tape Recorder, Video Disk Player, or TV (with composite output jack). With this Real Time board, live **video frames are captured in 1/30 of a second.** There's no need to have the source being captured remain motionless for a fixed period of time.

Using the HamCap utility, you can even **capture Hi-Res SSTV compatible pictures from the Pasokon TV program's menu.** There's no need to exit the Pasokon TV program, load a video program to capture a picture, convert the file format, store it to disk, exit the video program, reload the Pasokon TV program, and then read the stored file in! Just capture and transmit!

ColorEyes/RT also comes **complete with both DOS and Windows (3.1) video capture software** so that you can store and use video pictures for use by other programs. Video frames can be captured and stored with **resolutions up to 640x480 in 16.7 million colors.** Great for desktop publishing, picture databases, windows backgrounds, and importing into paint programs. You can **even capture video animation** in several popular formats to play back on your VGA screen. Please read the enclosed ColorEyes/RT brochure for further details.

Special Limited Time Offer!

ColorEyes/RT retails for $399.00 and Radioware's Spring/Summer '94 Catalog price will be only $329.95. However, as a customer of the Pasokon TV adapter, we are offering you this great video capture board for **a really great price of only $309.95** plus $7.95 for shipping & handling ($11.95 S&H for Canadian orders). But hurry, this special offer will end on March 31, 1994. For overseas customers a PAL version is available for only $319.95 ($339.95 after March 31, 1994) plus $29.95 shipping & handling. Call 800 950-9273 (Int'l call 508 452-5555) to order.

YES! I want to take advantage of Radioware's special ComputerEyes/RT offer. My shipping and payment information is entered below.

Can't Wait? **Call 1-800 950-9273** (Int'l 508 452-5555) to order

ColorEyes/RT (NTSC version) $309.95 (PAL version) $319.95 $_____

Shipping/Handling (US) $7.95 (Canada) $11.95 (Int'l) $29.95 $_____

Mass Sales Tax (Mass Residents only) $14.50 $_____

Total Purchase Price $_____

NOTE: WE MUST HAVE YOUR HAM CALL TO PROCESS !

Name _____ Call _____

Company _____ Phone _____

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City _____ State _____ Zip _____

❑ Check or Money Order Enclosed ❑ Send COD (US orders only, add $4.95 to S&H)

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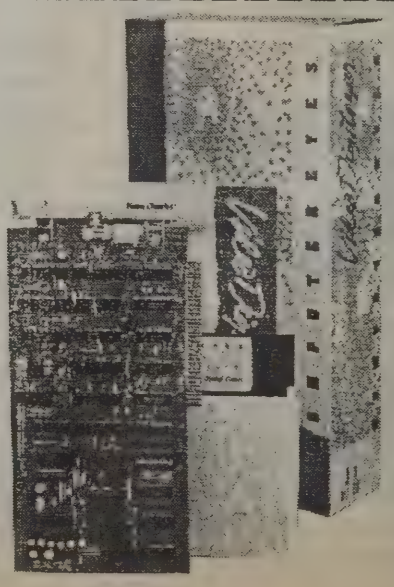


So You Want to Build an ATV Repeater?!

Mike Collis WA6SVT

Part 1

First in a series on how to design and build and ATV repeater system

How to get started with the Project.

I would like to give you some background in how I first got into the ATV building activity. Back in 1979 I had the vision of building an ATV repeater to enhance the everyday and reliability of ATV communications in the southern California area. Had I known then, that would lead to eight ATV repeaters and interlinking between them I might have gone another way in Ham radio! This network is known as Amateur Television Network (ATN). Our success over the years is to be owed to two areas, someone to keep going no matter what happens--to see the project(s) through to its completion and most important is the group participation in the project(s).

When I first got started, I was told that it was very hard to build a repeater. At the time the only known repeater was WR4AAG, the Metrovision repeater in Washington, D.C. which was the pioneer ATV repeater build by Bruce Brown WA9GVK. My experience has been that many people talk about building a repeater, and only a small percentage actually see it through to completion. I think that conversation, more than any other motivation was enough to keep my drive level going to meet the challenges ahead.

It was rough going in 1979. There was no 1200 MHz ATV equipment available and almost everything had to be scratch built. A year of solid effort resulted in the first operating repeater from Mt. Wilson. At the time I was 19 years old. Now, at age 35, I am still thinking about the next project in our state wide (actually two states and maybe soon three) system. With that as a background let us get down to business.

In anticipation that this may generate many questions, I will be in the ATVQ booth at Dayton this year. Drop by booth 58 (main arena, near the center, with the other movers and shakers of ham radio)

When your group decides to build a repeater you should consider the following points to give the project direction:

1. What area do you want the repeater to cover?
2. Are there other repeaters that you can interconnect with?
3. What is the current ATV activity in the desired coverage area?
4. What are you willing to spend and what support can you obtain?
5. Is there someone to spearhead the project and see it through to completion? The answer to question one is the easiest to describe, finding a location for your antenna will the challenge to fulfill that answer. Usually the highest building, tower or hill/mountain you can find in the center of the coverage area will be off-limits because of other prior users. Fear not, the site owners may still let you use the site. Otherwise, look for the second best site. Many remote site owners would love to have the security of a TV camera tied into the alarm system to see who is breaking into the site building. This is one of the best ways to secure a site. Offer free camera surveillance! The other thing to remember is to use professional conversation with the site owner and avoid ham talk about the repeater. If someone is in the two-way radio or broadcasting business in your group, he or she may be the best person to secure a

So You Want to Build an ATV Repeater?!

site at a reasonable cost. When the site has been selected, be sure to get enough antenna locations on the tower to building to satisfy initial and future needs of repeating, control, and linking.

Connection into a multi-combiner may be necessary in some instances for a receive antenna to save tower space, or share an existing antenna. This works for vertical polarization; it is not likely that you will find a horizontally polarized antenna to share. Avoid polarity wars between the local ATV users and settle on which polarity you are going to use in advance!

Some things to avoid are using coax or ham type antennas in your proposal to the site owner. If you must build you own, try to use old commercial antenna radomes so it doesn't look home made. Your equipment should be neat and housed in a professional rack cabinet. Many site owners are reluctant to allow a "bunch of junk" to be piled in a corner with cables and other stuff haphazardly strewn about. Site owners are not pleased by sloppy installs, inadequate filtering and QRM!

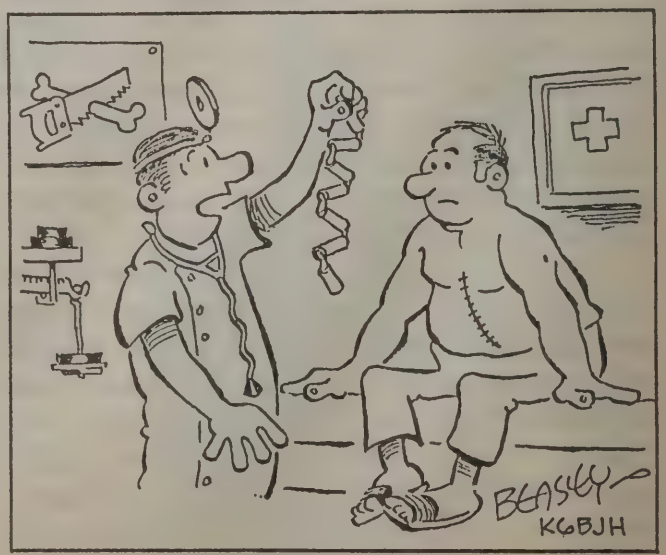
Are you insured? Many site owners now require a $1,000,000 liability insurance to protect them from damage from your accidents, equipment and antennas. The best way to get reliable insurance is from your ARRL group liability insurance program. The cost is about $260 per year and requires that 51% of your group are ARRL members. This will not only protect your sites but your group's activities (public service) should someone be hurt from your antenna or camera falling over.

Cost: Most ATV repeaters will require $1,000 to start and go up from there. Not everything needs to be new, but it does need to be in good condition in operation and professional in appearance. Home brew is good if you can meet these requirements. I will provide more equipment details in following parts of this series. Obtain some good low loss heliax and connectors. Usually ham flea markets and surplus houses are good sources. Many commercial antenna sites will not allow "leaky" RG8 type coax and the physical supports usually demand heliax type cable usage. Used racks can usually be gotten free but require a good paint job and cleaned before use. Don't forget you should maintain a clean environment where your repeater is located, be prepared to vacuum out the cobwebs, hornet nests and such!

Frequencies:

This may be the hardest thing to do as many want to pick frequencies for the convenience of crystals on hand or that cable ready TV sets pick up a particular channel. These should be the last considerations. More importantly are the following:

1. An output frequency that is as clear of other ham activity as possible and is in the bandplan if one exists! Not every area follows the ARRL SUGGESTED bandplan. Local coordination and usage are more important than a bandplan.
2. AM or FM output? The easiest for potential users is VSB AM which can be received with a simply down converter and TV set or a cable ready set if the tuner sensitivity is good. This keeps the cost down and you can put together broadcast quality pictures now with available modules and equipment. Also, more power can be used to reach the necessary picture level in your coverage area.
3. One receiver can be used to repeat the simplex frequency that you use but a second receiver on one of the higher bands using FM ATV will work with less QRM and DX is as good as the repeater output or better.
4. Work with your frequency coordinator to secure your frequencies. I will go into equipment details and configurations in follow on articles. So keep the phosphors glowing and your ATVQ subscription current! 73 Mike WA6SVT

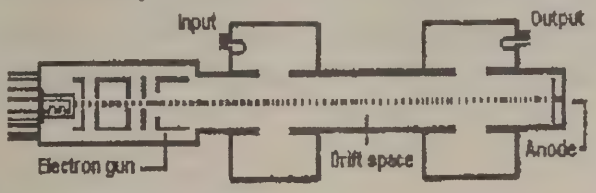


WE FOUND THESE NI-CADS INSIDE YOU --- WHAT ARE YOU TRYING TO DO, MAKE YOURSELF RECHARGEABLE ?

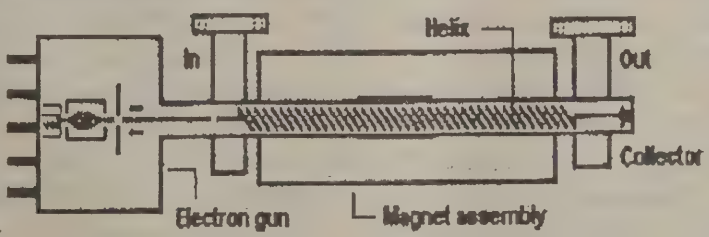
HIGH POWER MICROWAVE AMPLIFIERS

Steve Walsh G8KUW
from P5, Severnside newsletter

For the amateur constructor, 10GHz is probably the easiest of microwave bands on which to get active, at low powers. The wide availability of Gunn diode oscillator modules has made 3cm the roast popular of the bands above 24cm. Unfortunately. if you need powers above a few milliwatts, things start to get a bit more complicated. This article covers some of the options for the generation of higher powers. It is not intended that any of these areas will be a complete guide to building a 3cm amplifier, but a more detailed project article will be generated for sometime in the future.



Solid state amplifiers modern semiconductor devices that have useful power at 3cm are gradually becoming more accessible, that is more available and less costly to the amateur constructor. GasFET devices that operate at this frequency are physically very small, and lend themselves to micro strip designs that can even be built into a mechanical wave guide, provide useful gain at the lower power stages but GasFET devices capable of 300 mW output are becoming increasingly common. The calculation of Zin and Zout of the FET device and microstrip dimensions is best left to a "SPICE" type circuit modeling program but many PCB designs are published that can easily be adapted by the constructor. The power supply requirements are simple and providing that good decoupling is applied to all virtual ground points a very stable amplifier can be built. This design is easily cascaded to progressively more powerful stages. The SMT devices in common use today are ideal for microstrip construction since they have no lead inductance and are physically small. The higher power devices require attention be paid to dissipating the heat generated by the FET, especially if the layout is prone to self oscillation. Standard epoxy glass fire PCB is not usually suitable for this type of circuit, being too lossy. The more expensive FRY PTFE I glass fibre PCB has a very high dielectric constant, perfect for microstrip design.



Klystrons

Due to the power supply requirements, the incorporation of these devices into an amateur project is probably only for the dedicated few. A Klystron is a thermionic valve tube device that can operate as either an oscillator or an amplifier sometimes as both, if you are not careful! The power requirements are similar to standard valves tubes), being -200v, +300v, and heaters, but good regulation of these high voltages is critical to avoid unwanted oscillation

Dual cavity Klystron amplifiers primarily used as an amplifier, the dual cavity Klystron design is the easiest to understand. The input cavity is sometimes called the buncher because it uses the incoming RF to velocity modulate an electron beam fired through the center of the cavities. As the electron beam travels along the drift space towards the anode it passes through a second cavity called the catcher. This cavity collects the energy from the electron beam. The current density variations in the electron beam produce a voltage wave in the cavity. The catcher will normally be tuned to the desired frequency, usually the same as the exciter frequency, but may be tuned to a harmonic if desired thus obviating the need for a varactor or step recovery diode tripler.

Reflex Klystron sources.

Another design of klystron tube is the reflex klystron, this type has only a single cavity that acts both as a buncher and catcher This is achieved by bouncing the electron beam back into the cavity by a negativly charged repeller electrode. This single cavity design is usually, but not exclusively, used as a source. Typical device designed for 10GHz is a 21K25 This looks very like an ordinary metal octal based valve but can generate 40-50 mW as a 3 cm source. As with a dual cavity device, the voltage regulators are critical, but the repeller voltage can be adjusted to tune the exact output frequency.

Traveling wave tubes are similar in principle to the dual cavity klystron, except that the electrons are guided through a helix inside what would be the Klystron drift space and that the RF input signal is fed along the helix. The electron beam is held centrally within the helix by a strong magnetic field. The interaction between the magnetic field of the helix and the beam causes the charge density of the electron beam to be modulated. This modulation increases along the length of the helix until it is picked up by the output waveguide coupling. An area around the central part of the helix is usually painted with graphite paint to dampen any self oscillation.

CALIBRATE YOUR FM TV RECEIVER TO MEASURE VIDEO DEVIATION

By J. R. Mathison, WB9OQM

This simple calibrator and an oscilloscope will allow calibration of an FM TV receiver IF system to measure video deviation.

The measurement of pre-emphasized video deviation is based on the total peak-to-peak amplitude of the pre-emphasized video compared to the ratio of the amplitude at white. See the drawing for comparative levels of pre-emphasized video and assume commercial standards of 125 nanoseconds for rise and fall times to and from white and CCIR 405 pre-emphasis

The low frequency white bar is attenuated by 12.92 db while the high frequency rise and fall times are increased in amplitude by 2.93 db by the pre-emphasis network. The total difference is 15.85 dB (a factor of 6.20) between total peak-to-peak amplitude and the amplitude of white to blanking. We can measure the composite video amplitude at the de-emphasized video output of a calibrated receiver and infer the total pre-emphasized levels -- assuming correct pre-emphasis at the proceeding FM TV transmitter.

The calibrator substitutes a square wave of known deviation for the video allowing calculation of a calibration factor for the receiver de-emphasized video output. The accuracy of the receiver de-emphasis and video frequency response is not too important in this case since calibration and measurement are both done at the low frequency end of the base band range. Measurement errors will mostly be caused by frequency response inaccuracies at the proceeding FM TV transmitter.

The calibrator circuit consists of two crystal controlled overtone oscillators alternately switched ON by a multi vibrator timing and switching circuit. Crystals (surplus OK) should be chosen approximately 1 to 1.5 MHz apart in frequency and their average frequency should approximately correspond to your receiver IF center frequency. The average frequency is not too critical assuming the receiver IF has a flat RF band pass through the two switched frequencies.

The calibrator which I use has crystals of 71.245 and 69.745 MHz for an average frequency of 70.495 MHz for use with a MHz IF system. The oscillator tank inductors (Ll-L2) are each 8 turns of number 22 enamel led wire spaced one wire diameter and formed on a 1/4 inch drill bit. Tuning capacitors (Cl & C2) are 6 - 50 pf trimmers which resonate at approx midrange with the above crystals. The transistors in my unit are all 2N3904 and anything similar should work . The oscillators use a very high level of feedback to insure fast starting at the switching rate and a good quality square wave at the receiver video output. Oscillator output capacitors (C3 & C4) are identical wire gimics of 1 or 2 pf tapped down on the tank coils at 2 turns from the ground end.

Calibrator adjustment is performed by feeding its output into the receiver IF system and using wire cutters trim the C3 & C4 wire mimics the same amount for correct RF level into your IF system. Tune Cl & C2 for best square waveform as observed on an oscilloscope connected to the receiver video output. The calibrator switches frequencies at a rate of approximately 2860 hz which should be well above the low frequency limitations of some video amplifiers.

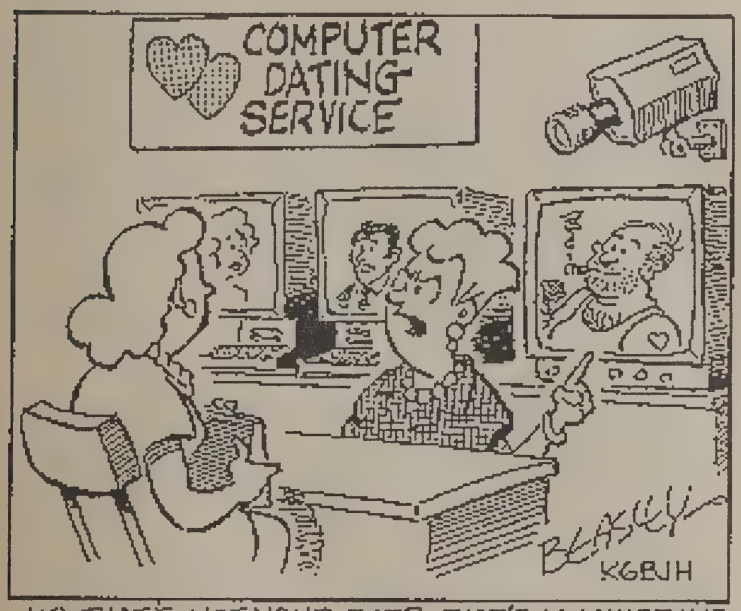
Receiver calibration is done by measuring the peak-to-peak amplitude of the square wave (ignore any overshoot) at the receiver de-emphasized video output and calculating the calibration factor using the formula:

$$\text{Cal factor} - (Fh - Fl) \quad \frac{(6.2)}{2} \quad \frac{(0.714)}{\text{sq. w}}$$

where:
Cal factor; peak deviation in MHz per volt of composite video.

(fh - fl): frequency difference in MHz between the two calibrator crystals.
sq. w: peak-to-peak amplitude of the square wave in volts.

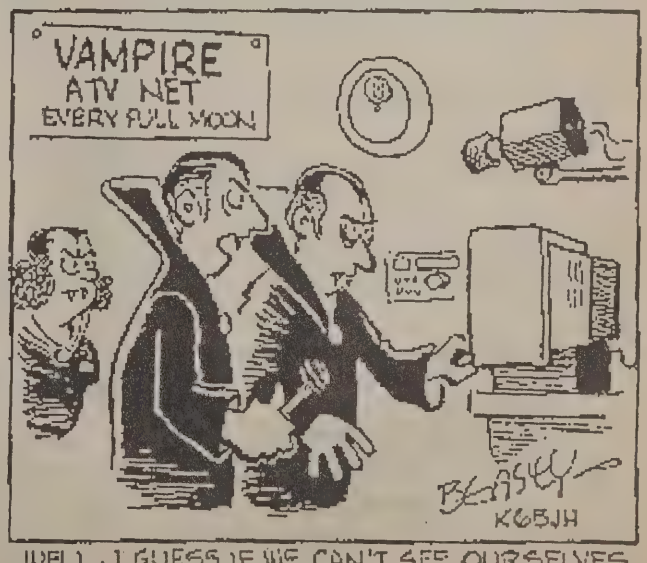
Operational measurements of pre-emphasized video deviation are made by measuring the total peak-to-peak amplitude of the composite video (sync tip to white) in volts and multiplying by the receiver calibration factor. Some cautions are in order at this point. The video must contain white. You may have to watch it for a while on the oscilloscope to determine the actual white level. Video-to-sync ratio must also be correct. If not, measure the level from blanking to white and multiply by 1.4 to get a corrected composite video amplitude to multiply by the calibration factor.



NO. THAT'S NOT YOUR DATE, THAT'S MY HUSBAND CALLING ME ON ATV!

Sub carrier deviation may also be measured if your calibrated de-emphasized test point carries them. Use the same calibration factor as for composite video. The frequency response of your de-emphasis network and video amplifiers now become important because measurement is done at the high frequency end of the base band range but calibration was done at the low end. Filter out one sub carrier at a time for peak-to-peak amplitude measurement on the oscilloscope and correct this level by the filter attenuation factor before multiplying by the receiver deviation calibration factor. Sub carrier deviations will actually be a few percent higher than indicated due to their placement on the pre-emphasis curve.

The calibration of a FM TV receiver to measure deviation of video which has not been pre-emphasized and the calibration of a video test point ahead of the de-emphasis network are both the same procedure. The calibrator (Fh - fl) gives a reference peak-to-peak deviation level and the receiver peak-to-peak calibration factor is obtained by direct proportion. Divide the peak-to-peak factor by 2 to get the peak deviation receiver calibration factor. Peak deviation for video is actually the average of FM carrier swings due to the asymetrical waveform of video. This simple calibrator is a lot easier to use than setting up all the necessary test equipment to do a Bessel carrier null calibration on your FM TV receiver. I hope everyone finds it as useful as I have.



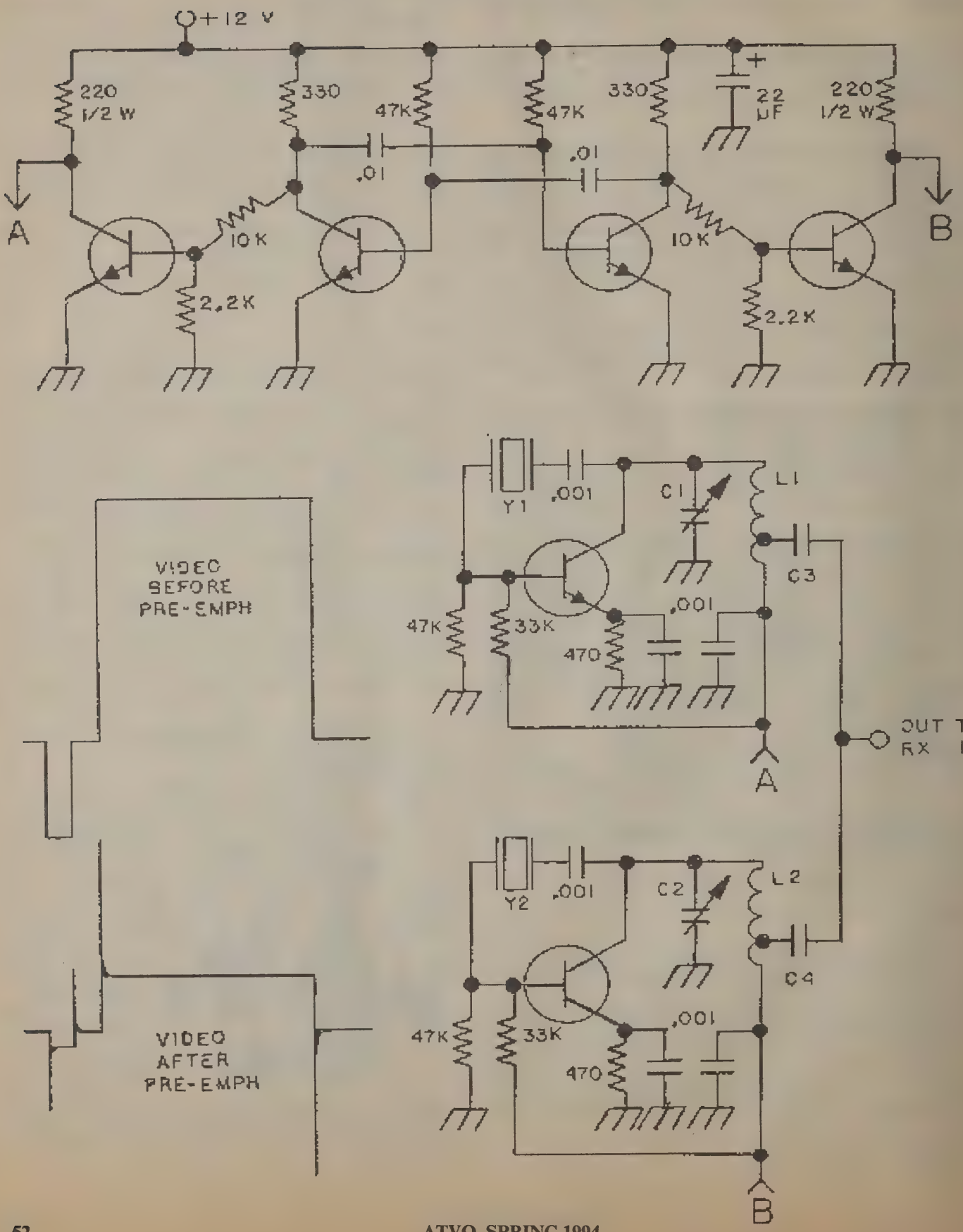
WELL, I GUESS IF WE CAN'T SEE OURSELVES IN A MIRROR, WE WON'T SHOW UP ON A TV MONITOR!

LETTERS:

I Recently read the article about Amateur Television Quarterly's award for DX'ers in the December copy of Electronics Now. I have heard about amateur television before, but was previously unable to obtain information about it. I would greatly appreciate a chance to subscribe to ATVQ and would also like information on DXing. In the past I have done some DXing picking up commercial stations in Dade county Florida and a test pattern from a station in Cuba.

Rick Rouser, Logansport, IN.

FM VIDEO CALIBRATOR



A SYNTHESIZED 24CM FM TELEVISION TRANSMITTER

Tim Forrester G4WIM

FROM Elector Magazine, edited from a reprint in CQ-TV.

Introduction

Due to the availability of satellite receivers, receiving it usually the first step towards operating on TV and normally presents few problems. Having successfully received some amateur signals, viewers then more often than not want to transmit as well! The problem is how to construct an effective Transmitter, given the inherent problems of 1.3 GHz construction. (one of the major hurdles with any 1.3 GHz design is consistency, i.e. ensuring that any copy of the design it built exactly the same, even down to component lead lengths and height above the PCB, etc. Other problems are the frequency stability and power output, both must be adequate to ensure a noise free picture into the repeater

Dealing with the problem of components first, this design is totally surface mount. That means all the components are soldered directly to the board with preset lead lengths and at a pre-detertmined height above the PCB. This technique ensures a high degree of repeatability and as a bonus a compact easily portable design for outside use.

Obviously a free running oscillator at 1.3 GHz is going to drift.but as the receiver bandwidth is typically 15 MHz its not too much of a problem. The transmitter though is a fairly powerful compact design and the heat generated from other parts of the circuit could lead to unacceptable amounts of frequency drift. Therefore a simple phase locked loop is included to maintain frequency accuracy more on the design of the loop later. If operators don't mind the occasional retune of the transmitter frequency. It is possible to leave out the PLL circuits and install a potentiometer to set the operating frequency. This approach makes for a unit costing approximately $50 less than for the complete device. Of course the PLL circuit could always bc added at a later date.

RF power gain at 1.3 GHz can be difficult to achieve (and expensive) using individual components, fortunately these days it is possible to buy RF power amplifiers which come in the form of modules offering guaranteed performance. Their cost is considerably less than buying the individual parts and there are no alignment problems.

The inclusion of sound circuitry is very simple and based upon well proven techniques and does not merit much description. It too uses surface mount parts for the sake of consistancy and ease of mounting the PCB. Other designs have been published which use more complex audio circuits and subcarrier oscillators, but it has been found that this simple circuit is perfectly adequate for working simplex and into the repeater. GB3MV actually uses a more complex arrangement to peak limit the deviation and maintain the subcarrier frequency to tighter limits. 70CM TV has traditionally used amplitude modulation (AM) which means that all the Modulation stages and subsequent amplifiers had to be linear if picture distortion was to be avoided. On 23cm frequency modulation (FM) is used almost exclusively. FM offers several advantages over AM for TV work and few disadvantages. Perhaps the major advantage is that RF amplifiers can operate in Class C. i.e. a non-linear but high efficiency mode. Also a properly designed FM TV receiver can exhibit a much better picture quality for a lower RF signal to noise ratio at the receiver input. These two reasons alone explain why FM is used for satellite TV broadcasting and why amateurs have adopted similar techniques and standards. Broadly speaking, any FM TV transmitter comprises the same basic stages as follows:

i) RF oscillator either on frequency or multiples to final frequency.

ii) Preemhasized FM modulator usually associated with i) above.

iii) Frequency maintaining phase locked loop

iv) Soundd amplifier and sub-carrier oscillator

v) RF power amplifiers

The Circuit design

As can be seen from figure 1, this design follows the basic principles outlined above. In detail. the RF oscillator is formed by T2 running directly at 1.3 GHz. D3 is used to modulate the oscillators frequency with both base band video and the 6 MHz sound sub-carrier, in conjunction with the PLL circuits it also maintains the desired

mean frequency.

As FM noise rises with frequency, a better overall system signal to noise ratio can be achieved by boosting (pre-emphasising) the high frequency video signal and then using de-emphasis at the receiver, the desired flat frequency response is restored the same principle as is used on terrestrial FM radio. In this design the components between J3 and R26 perform pre-emphasis to CCIR 405, a broadcast standard. R26 sets the total video deviation.

U6 and U5 amplify the low level signal from T2 up to circa 2 watts output. The transmitter RF output is turned on by applying bias to U5 via a switch on J2. The PLL is left running all the time power is applied to the unit. U2 is the sound preamplifier and pre-emphasis circuit, with T1 being a frequency modulated 6 MHz oscillator. The exact frequency and level of the sound sub-carrier is set by C20 and R12 respectively.

The PLL used in this design is very basic and uses only two ICs, U3 and U7. There is no loop filter op-amp, instead the output of U3 is used directly to drive the loop filter whose output via R30 controls the mean voltage on D3 and hence the oscillator frequency. R1 and R6 are in series purely to make the PCB layout easier!

U7 is used as a fixed divide by 128 pre-scaler to bring the output of T2 down to within range of U3. The reference frequency of U3 for use with its internal phase detector is 8 MHz divided by 2048, giving a reference of 3.90625 KHz. This results in a channel step of 500 KHz at 1.3 GHz when it is multiplied by 128 by U7.

For good quality pictures the overall frequency response of a TV transmitter ideally would be from DC to approximately 5.5 MHz. Usually the high frequencies are not too much of a problem, providing care is taken with the design. However when using a PLL which tries to maintain the nominal carrier frequency, if the PLL bandwidth is too great it can effectively strip off any low frequency components. Therefore to ensure the PLL cannot attenuate or distort the low frequency frame sync pulses, it must have a loop bandwidth of less than 50 Hz. The design presented here has a loop bandwidth of circa 30 Hz, easily low enough to ensure adequate low frequency response.

A side effect of using a low loop bandwidth with a basic design like this is the PLL lock up time. Typically the PLL could take several hundred milliseconds to acquire lock from switch on. That is why in this design the PLL is kept 'hot' all the time and the transmitter turned on by applying bias to the PA. This technique offers the benefit of having a low level signal present for picture alignment purposes before actually going 'on-air'. The low loop band band widthr of 30 Hz also makes it very easy to attenuate any traces of the 3.90625 kHz reference frequency which may otherwise leak through into the signal path and modulate the transmission.

By varying the divide ratio in U3, it is possible to program any other frequency in the band to a resolution of 500 KHz. With a link (or switch) across J5 the transmitter will operate on 1249 MHz, the most popular repeater input frequency. Due to spreads in Xl and C23 and C36 the reference oscillator may not be exactly on 8 MHz and result in a slight frequency offset of maybe up to 100 KHz, not a problem with a 15 MHz receiver bandwidth! If desired C23 could be trimmed to ensure operation On exactly 1249 MHz. Leaving J5 open circuit results in the transmitter operating on 1265 MHz for simplex operation. All the "N" programming inputs to U3 have Internal pull up resistors so its quite in order to leave J5 open circuit.

Construction

Virtually all the parts used in this design are readily available surface mount types, however there are a few parts which are normally leaded. Xl, UI and U3 require converting to surface mount, easily achieved by forming the leads to fit the pads on the PCB.

Generally the use of surface mount parts throughout makes installing the PCB into a case very easy with no need for special spacers etc. Additionally, by fastening the PCB directly down to the case a good earth is ensured between the PCB ground plane, RF power amplifier module and the case, this in turn leads to a more reproducible design with less chance of RF instability due to circulating earth currents. The printed circuit board is designed to fit into a standard die cast box approxin1ately 4.75 x 3.75 x 1". [f continuous Operation is envisaged, then an additional heat sink is recomended. In certain critical areas operating at 1.3 GHz, ATC capacitors are used. I would not recommend using any other manufacturer, otherwise the circuits may not operate as intended. Building the unit up is very easy, providing a small tipped iron, a pair of tweezers and fine gauge (32 SWG or similar) solder are used. It is recommended that all passive

parts are loaded first. followed by the semiconductors, leave fitting the RF power amplifier till last when the unit is ready to be installed in its case. All testing and alignment is carried out with the PCB in place. Ensure that when loading Polarized components (especially diodes and capacitors) they are fitted the correct way around, an obvious statement but when using surface mount components its sometimes difficult to identify which end is which. Figure 2 shows the location of all parts on the PCB and identifies by means of a black rectangle which is pin 1 of any component, so with reference to the circuit diagram in figure 1 it is possible to determine the correct orientation. While building the unit, take care to inspect each joint as its made, then if possible before applying power wash the PCB in a suitable solvent and then check all the joints again. Care in construction will save many hours of fault finding and possibly damaged components.

Testing

It is assumed that constructors have no suitable 1.3 GHz test equipment, but do have a satellite receiver, a source of composite video, an ammeterr, a DM or high impedance multimeter and some sort of aerial load (either a dummy load, watt meter or aerial).

The first step is to ensure that the PLL is operating and holding the frequency on 1249 MHz. Make sure that J5 is linked (so Programming 1249 MHz) and that J2 is NOT linked (so disabling the power amplifier). Apply power to Jl via an ammeter (the standby current should be about 70mA), then using a high impedance voltmeter or DVM, monitor the voltage at the junction of R10 and R30, adjust C13 until the voltage reading is between 2 and 7 volts, ideally mid range i.e. 4 Volts. Remove the trimming tool after each adjustment as stray capacity from the trimming tool will often affect the oscillators free-running frequency and hence the required control voltage from the PLL. Remove the link on J5, so programming the PLL for 1265 MHz and note that the voltage increases slightly, but still remains somewhere between 2 and 7 volts. If all is well replace the link on J5 and tune the satellite tuner to 1249 MHz. A blank raster or similar should be on the screen. Make sure a suitable load or watt meter is connected to J6. Link J2 to enable the power amplifier. The supply current should now be about I ampere and the RF output power about 2 watts.

Set both R12 and R26 fully counter clockwise then apply a video source to J3. Gradually turn R26 clockwise until a picture is seen with a good balance between contrast and grey scale. Ideally use a patter generator as a source of video. Conneect an eletret microphone to J4 and set R20 mid-way. Make sure that the satellite tuner sound channel is set for 6 MHz. While Watching the picture tune R12 until a slight patterning can be seen, then reduce it until it just becomes invisible. Adjust C20 for maximum quieting on the sound channel combined with best audio quality. Following the above should procedure whould be sufficient to be on-air.

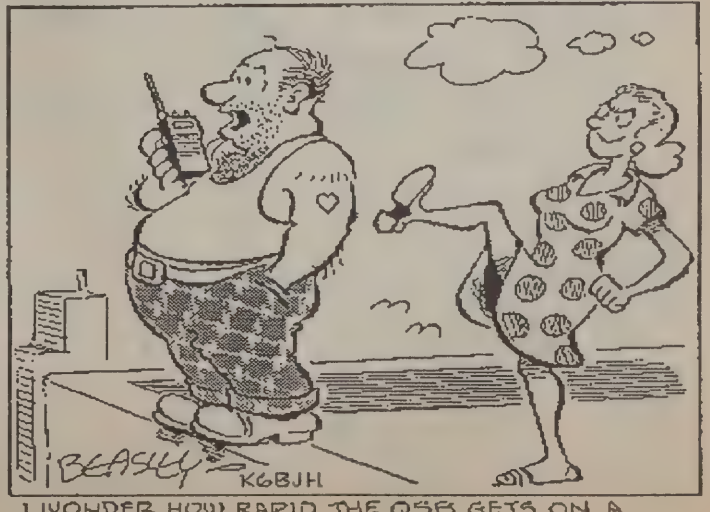
ATV Operation

Ideally all amateurs aiming to use ATV should try to run "look through" when operating through a repeater. Running look through offers several advantages such as being able to align and adjust your signal through the repeater for best results. Secondly if someone else wishes to use the repeater they can usually be seen to cause patterning so you can drop off to allow the other station to operate.

Conclusion

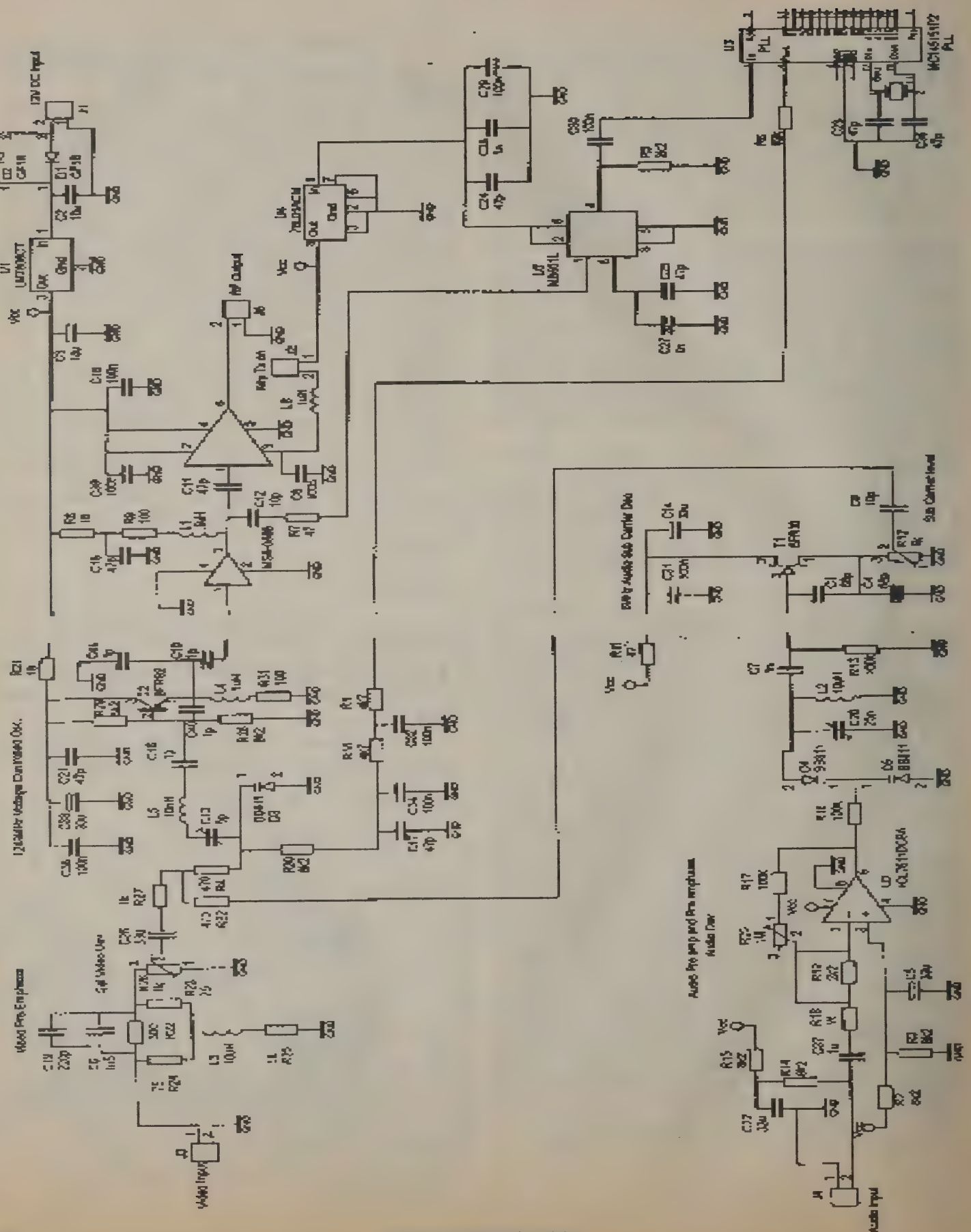
Television is a very technical field and much more demanding in terms of equipment performance and operation, however because of these problems, the rewards for success are that much greater and well worth the effort.

Finally I would like to thank Eddie (G3ZJO, Mike G6CJN, Dave G4SCJ and George G0KOG for their help in proving and testing the design.



I WONDER HOW RAPID THE QSB GETS ON A FALLING BODY

24 CM TRANSMITTER



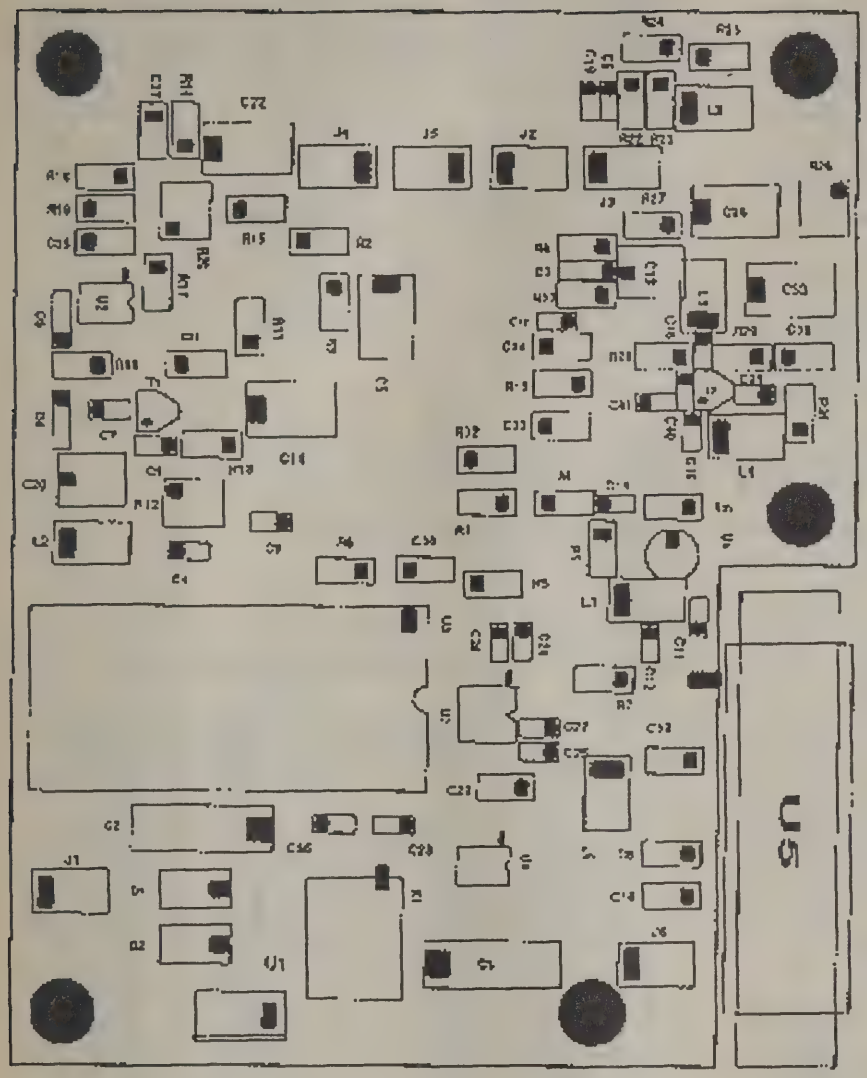


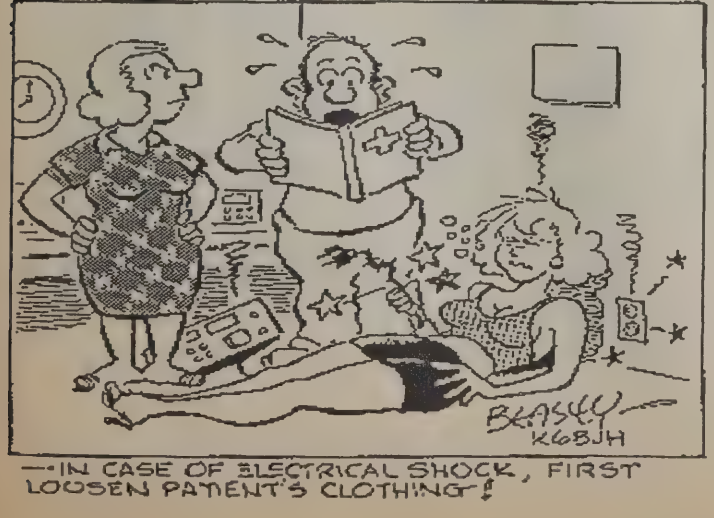
Fig.2: Compoent Overlay for the 24cm FM ATV Transmitter

Parts List

Item	Device	Value
C1	ATC100A	68p
C2	elec	10u
C3	elec	10u
C4	ATC100A	68p
C5	tant	33u
C6	ATC100A	1n5
C7	ATC100A	1n
C8	CER.CAP	100n
C9	ATC100A	10p
C10	ATC100A	1p
C11	ATC100A	47p
C12	ATC100A	10p
C13	trime	5p
C14	tant	33u
C15	ATC100A	47p
C16	ATC100A	1p
C17	ATC100A	47p
C18	CER.CAP	100n
C19	ATC100A	220p
C20	trime	25p
C21	ATC100A	47p
C22	tant	33u
C23	ATC100A	47p
C24	ATC100A	47p
C25	ATC100A	47p
C26	ATC100A	1n
C27	ATC100A	1n
C28	ATC100A	1n
C29	CER.CAP	100n
C30	CER.CAP	100n
C31	CER.CAP	100n
C32	CER.CAP	100n
C33	tant	33u
C34	CER.CAP	100n

Item	Device	Value
C35	CER.CAP	100n
C36	ATC100A	47p
C37	CER.CAP	1n
C38	CER.CAP	100n
C39	CER.CAP	100n
C40	ATC100A	1p
C41	ATC100A	1p
D1	DIODE	GPIB
D2	DIODE	GPIB
D3	Vcap	BB811
D4	Vcap	BB811
D5	Vcap	BB811
J1	Hdr 2	
J2	Hdr_2	
J3	Hdr_2	
J4	Hdr_2	
J5	Hdr 2	
J6	Hdr_2	
L1	COIL	.1uH
L2	COIL	10nH
L3	COIL	10uH
L4	COIL	.1uH
L5	COIL	8nH
L6	COIL	.1uH
R1	RES.25W	4k7
R2	RES.25W	8k2
R3	RES.25W	8k2
R4	RES.25W	470
R5	RES.25W	2k2
R6	RES.25W	82k
R7	RES.25W	47
R8	RES.25W	18

Item	Device	Value
R9	RES.25W	100
R10	RES.25W	4k7
R11	RES.25W	47
R12	SMPOT	1k
R13	RES.25W	100k
R14	RES.25W	8k2
R15	RES.25W	8k2
R16	RES.25W	100k
R17	RES.25W	100k
R18	RES.25W	1k
R19	RES.25W	2k2
R20	RES.25W	18
R22	RES.25W	300
R23	RES.25W	75
R24	RES.25W	75
R25	RES.25W	18
R26	SMPOT	1k
R27	RES.25W	1k
R28	RES.25W	8k2
R29	RES.25W	8k2
R30	RES.25W	8k2
R31	RES.25W	100
R32	RES.25W	470
T1	N FET	BFR30
T2	RF_NPN	BFR92
U1	pos_reg	LM7808CT
U2	OP-Amp	ICL7611DCBA
U3	PLL	MC145151P2
U4	pos_reg	78L05ACM
U5	RF PA	M67715
U6	MMIC	MSA-0886
U7	DIVIDER	MB501L
X1	XTAL	8 MHz



—IN CASE OF ELECTRICAL SHOCK, FIRST LOOSEN PATIENT'S CLOTHING!

YOUR GETTING OLD WHEN

Ham radio is an exciting hobby to get in to at any age. As time goes by many of us find we have had the same experiences. The list of experiences below started when the first two items happened to me at the same Hamfest. Since then other hams, who have been in the hobby over thirty years like my self, have confirmed these sign posts along the road of "Getting Old".

You know your getting old when;

1. You don't look to see what the Hamfest prizes are any more.
2. You see equipment you have designed, for sale with a bunch of other junk at a Hamfest.
3. All the H.F. rigs look alike.
4. You can remember when 11 and 5 Meters were a ham bands.
5. You cannot find your HT with your glasses off.
6. You need a 25 inch TV monitor to watch ATV signals.

Tom Pusateri W9NBG

BLAME IT ON THE 60's

No, I am not talking about the Clinton spend and tax schemes!
PROPAGATION! Where has it gone?

From the article in last issue of ATVQ on commercial TV DX, we have received a number of responses. All had one common comment. What has happened to propagation? Michael Condon of Poynette, WI, who has DXed TV since the 50's had similar experiences to my own to wit, back in the 60's and early 70's there were a lot of long term (several days to a few weeks) band openings. These seem to not have occurred since. Even the "annual" Thanksgiving midwest band opening has been missing for the past two years. Perhaps it was ionized clouds from atomic testing!

Back in the 60's and 70's it was not unusual to have VHF band openings of thousands of miles which lasted for days, or were present several nights in a row. Mike has logged nearly 1,000 TV stations and commented on openings to Monterey, Mexico, Spokane, WA, Wilmington, DE, and Jackson, MS among many others. Last issue I printed pics of stations from Alaska, to South Carolina. Other stations I've received include WCBS, NYC and WGBH Boston.

You can purchase a special DX TV receiver from HS Publications, 7 Epping Close, Derby, England DE3 4HR. The model D-100 is 99 Pounds (About $140) and has bandwidth selection (without affecting the sound subcarrier reception, and continuous VHF and UHF tuning which also covers the 70 cm ham band.

For those who DX, or want to find interference from CATV systems, here is a complete set of frequency charts for VHF, UHF Cable, and multinational.

TV Frequency Charts

● VHF TV channel frequency assignments

JAPAN

CH	VIDEO (MHz)	SOUND (MHz)
1	91.25	95.75
2	97.25	101.75
3	103.25	107.75
4	171.25	175.75
5	177.25	181.75
6	183.25	187.75
7	189.25	193.75
8	193.25	197.75
9	199.25	203.75
10	205.25	209.75
11	211.25	215.75
12	217.25	221.75

U.S.A.

CH	VIDEO (MHz)	SOUND (MHz)
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

ANGOLA

CH	VIDEO (MHz)	SOUND (MHz)
1	43.25	49.25
2	52.25	58.25
3	60.25	66.25
4	175.25	181.25
5	183.25	189.25
6	191.25	197.25
7	199.25	205.25
8	207.25	213.25
9	215.25	221.25
10	223.25	229.25

AUSTRALIA

CH	VIDEO (MHz)	SOUND (MHz)
0	46.25	51.75
1	57.25	62.75
2	64.25	69.75
3	86.25	91.75
4	95.25	100.75
5	102.25	107.75
5A	138.25	143.75
6	175.25	180.75
7	182.25	187.75
8	189.25	194.75
9	196.25	201.75
10	209.25	214.75
11	216.25	221.75

C.C.I.R.

CH	VIDEO (MHz)	SOUND (MHz)
2	48.25	53.75
3	55.25	60.75
4	62.25	67.75
5	175.25	180.75
6	182.25	187.75
7	189.25	194.75
8	196.25	201.75
9	203.25	208.75
10	210.25	215.75
11	217.25	222.75
12	224.25	229.75

CHINA

CH	VIDEO (MHz)	SOUND (MHz)
1	49.75	56.25
2	57.75	64.25
3	65.75	72.25
4	77.25	83.75
5	85.25	91.75
6	168.25	174.75
7	176.25	182.75
8	184.25	190.75
9	192.25	198.75
10	200.25	206.75
11	208.25	214.75
12	216.25	222.75

INDONESIA

CH	VIDEO (MHz)	SOUND (MHz)
1A	44.25	49.75
2	55.25	60.75
3	62.25	67.75
4	175.25	180.75
5	182.25	187.75
6	189.25	194.75
7	196.25	201.75
8	203.25	208.75
9	210.25	215.75
10	217.25	222.75
11	224.25	229.75

ITALY

CH	VIDEO (MHz)	SOUND (MHz)
A	53.75	59.25
B	62.25	67.75
C	82.25	87.75
D	175.25	180.75
E	183.75	189.25
F	192.25	197.75
G	201.25	206.75
H	210.25	215.75
H1	217.25	222.75
H2	224.25	229.75

IRELAND

CH	VIDEO (MHz)	SOUND (MHz)
A	45.75	51.75
B	53.75	59.75
C	61.75	67.75
D	175.25	181.25
E	183.25	189.25
F	191.25	197.25
G	199.25	205.25
H	207.25	213.25
J	215.25	221.25

IVORY COAST

CH	VIDEO (MHz)	SOUND (MHz)
1	43.25	49.75
2	52.25	58.75
3	60.25	66.75
4	175.25	181.75
5	183.25	189.75
6	191.25	197.75
7	199.25	205.75
8	207.25	213.75
9	215.25	221.75

NEW ZEALAND

CH	VIDEO (MHz)	SOUND (MHz)
1	45.25	50.75
2	55.25	60.75
3	62.25	67.75
4	175.25	180.75
5	182.25	187.75
6	189.25	194.75
7	196.25	201.75
8	203.25	208.75
9	210.25	215.75

OIRT

CH	VIDEO (MHz)	SOUND (MHz)
1	49.75	56.25
2	59.25	65.75
3	77.25	83.75
4	85.25	91.75
5	93.25	99.75
6	175.25	181.75
7	183.25	189.75
8	191.25	197.75
9	199.25	205.75
10	207.25	213.75
11	215.25	221.75
12	223.25	229.75

MOROCCO

CH	VIDEO (MHz)	SOUND (MHz)
4	163.25	168.75
5	171.25	176.75
6	179.25	184.75
7	187.25	192.75
8	195.25	200.75
9	203.25	208.75
10	211.25	216.75

NEW FRANCE

CH	VIDEO (MHz)	SOUND (MHz)
A	47.75	41.25
B	55.75	49.25
C1	60.5	54
C	63.75	57.25
1	176	182.5
2	184	190.5
3	192	198.5
4	200	206.5
5	208	214.5
6	216	222.5

SOUTH AFRICA

CH	VIDEO (MHz)	SOUND (MHz)
4	175.25	181.25
5	183.25	189.25
6	191.25	197.25
7	199.25	205.25
8	207.25	213.25
9	215.25	221.25
10	223.25	229.25
11	231.25	237.25
12	-	-
13	*247.43	*253.43

*:Actual tuning freq.
13.VIDEO=247.45MHz
13.SOUND=253.45MHz

U.K.

CH	VIDEO (MHz)	SOUND (MHz)
1	[45.00]	[41.50]
2	51.75	48.25
3	56.75	53.25
4	61.75	58.25
5	66.75	63.25
6	179.75	176.25
7	184.75	181.25
8	189.75	186.25
9	194.75	191.25
10	199.75	196.25
11	204.75	201.25
12	209.75	206.25
13	214.75	211.25

C.C.I.R.

CH	VIDEO (MHz)	SOUND (MHz)
2	48.25	53.75
3	55.25	60.75
4	62.25	67.75
5	175.25	180.75
6	182.25	187.75
7	189.25	194.75
8	196.25	201.75
9	203.25	208.75
10	210.25	215.75
11	217.25	222.75
12	224.25	229.75

CHINA

CH	VIDEO (MHz)	SOUND (MHz)
1	49.75	56.25
2	57.75	64.25
3	65.75	72.25
4	77.25	83.75
5	85.25	91.75
6	168.25	174.75
7	176.25	182.75
8	184.25	190.75
9	192.25	198.75
10	200.25	206.75
11	208.25	214.75
12	216.25	222.75

INDONESIA

CH	VIDEO (MHz)	SOUND (MHz)
1A	44.25	49.75
2	55.25	60.75
3	62.25	67.75
4	175.25	180.75
5	182.25	187.75
6	189.25	194.75
7	196.25	201.75
8	203.25	208.75
9	210.25	215.75
10	217.25	222.75
11	224.25	229.75

ITALY

CH	VIDEO (MHz)	SOUND (MHz)
A	53.75	59.25
B	62.25	67.75
C	82.25	87.75
D	175.25	180.75
E	183.75	189.25
F	192.25	197.75
G	201.25	206.75
H	210.25	215.75
H1	217.25	222.75
H2	224.25	229.75

UHF TELEVISON FREQUENCIES

U.S.A.

CH	VIDEO (MHz)	SOUND (MHz)
14	471.25	475.75
15	477.25	481.75
16	483.25	487.75
17	489.25	493.75
18	495.25	499.75
19	501.25	505.75
20	507.25	511.75
21	513.25	517.75
22	519.25	523.75
23	525.25	529.75
24	531.25	535.75
25	537.25	541.75
26	543.25	547.75
27	549.25	553.75
28	555.25	559.75
29	561.25	565.75
30	567.25	571.75
31	573.25	577.75
32	579.25	583.75
33	585.25	589.75
34	591.25	595.75
35	597.25	601.75
36	603.25	607.75
37	609.25	613.75
38	615.25	619.75
39	621.25	625.75
40	627.25	631.75
41	633.25	637.75
42	639.25	643.75
43	645.25	649.75

CH	VIDEO (MHz)	SOUND (MHz)
44	651.25	655.75
45	657.25	661.75
46	663.25	667.75
47	669.25	673.75
48	675.25	679.75
49	681.25	685.75
50	687.25	691.75
51	693.25	697.75
52	699.25	703.75
53	705.25	709.75
54	711.25	715.75
55	717.25	721.75
56	723.25	727.75
57	729.25	733.75
58	735.25	739.75
59	741.25	745.75
60	747.25	751.75
61	753.25	757.75
62	759.25	763.75
63	765.25	769.75
64	771.25	775.75
65	777.25	781.75
66	783.25	787.75
67	789.25	793.75
68	795.25	799.75
69	801.25	805.75

JAPAN

CH	VIDEO (MHz)	SOUND (MHz)
13	471.25	475.75
14	477.25	481.75
15	483.25	487.75
16	489.25	493.75
17	495.25	499.75
18	501.25	505.75
19	507.25	511.75
20	513.25	517.75
21	519.25	523.75
22	525.25	529.75
23	531.25	535.75
24	537.25	541.75
25	543.25	547.75
26	549.25	553.75
27	555.25	559.75
28	561.25	565.75
29	567.25	571.75
30	573.25	577.75
31	579.25	583.75
32	585.25	589.75
33	591.25	595.75
34	597.25	601.75
35	603.25	607.75
36	609.25	613.75
37	615.25	619.75
38	621.25	625.75
39	627.25	631.75
40	633.25	637.75
41	639.25	643.75
42	645.25	649.75

CH	VIDEO (MHz)	SOUND (MHz)
43	651.25	655.75
44	657.25	661.75
45	663.25	667.75
46	669.25	673.75
47	675.25	679.75
48	681.25	685.75
49	687.25	691.75
50	693.25	697.75
51	699.25	703.75
52	705.25	709.75
53	711.25	715.75
54	717.25	721.75
55	723.25	727.75
56	729.25	733.75
57	735.25	739.75
58	741.25	745.75
59	747.25	751.75
60	753.25	757.75
61	759.25	763.75
62	765.25	769.75

C.C.I.R.

CH	VIDEO (MHz)	SOUND (MHz)
21	471.25	476.75
22	479.25	484.75
23	487.25	492.75
24	495.25	500.75
25	503.25	508.75
26	511.25	516.75
27	519.25	524.75
28	527.25	532.75
29	535.25	540.75
30	543.25	548.75
31	551.25	556.75
32	559.25	564.75
33	567.25	572.75
34	575.25	580.75
35	583.25	588.75
36	591.25	596.75
37	599.25	604.75
38	607.25	612.75
39	615.25	620.75
40	623.25	628.75
41	631.25	636.75
42	639.25	644.75
43	647.25	652.75
44	655.25	660.75
45	663.25	668.75
46	671.25	676.75
47	679.25	684.75
48	687.25	692.75
49	695.25	700.75
50	703.25	708.75
51	711.25	716.75
52	719.25	724.75

CH	VIDEO (MHz)	SOUND (MHz)
53	727.25	732.75
54	735.25	740.75
55	743.25	748.75
56	751.25	756.75
57	759.25	764.75
58	767.25	772.75
59	775.25	780.75
60	783.25	788.75
61	791.25	796.75
62	799.25	804.75
63	807.25	812.75
64	815.25	820.75
65	823.25	828.75
66	831.25	836.75
67	839.25	844.75
68	847.25	852.75
69	855.25	860.75

CHINA

CH	VIDEO (MHz)	SOUND (MHz)
13	471.25	477.75
14	479.25	485.75
15	487.25	493.75
16	495.25	501.75
17	503.25	509.75
18	511.25	517.75
19	519.25	525.75
20	527.25	533.75
21	535.25	541.75
22	543.25	549.75
23	551.25	557.75
24	559.25	565.75
25	607.25	613.75
26	615.25	621.75
27	623.25	629.75
28	631.25	637.75
29	639.25	645.75
30	647.25	653.75
31	655.25	661.75
32	663.25	669.75
33	671.25	677.75
34	679.25	685.75
35	687.25	693.75
36	695.25	701.75
37	703.25	709.75
38	711.25	717.75
39	719.25	725.75
40	727.25	733.75
41	735.25	741.75
42	743.25	749.75
43	751.25	757.75
44	759.25	765.75

CH	VIDEO (MHz)	SOUND (MHz)
45	767.25	773.75
46	775.25	781.75
47	783.25	789.75
48	791.25	797.75
49	799.25	805.75
50	807.25	813.75
51	815.25	821.75
52	823.25	829.75
53	831.25	837.75
54	839.25	845.75
55	847.25	853.75
56	855.25	861.75
57	863.25	869.75

ELKTRONICS

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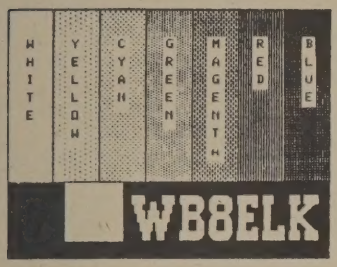

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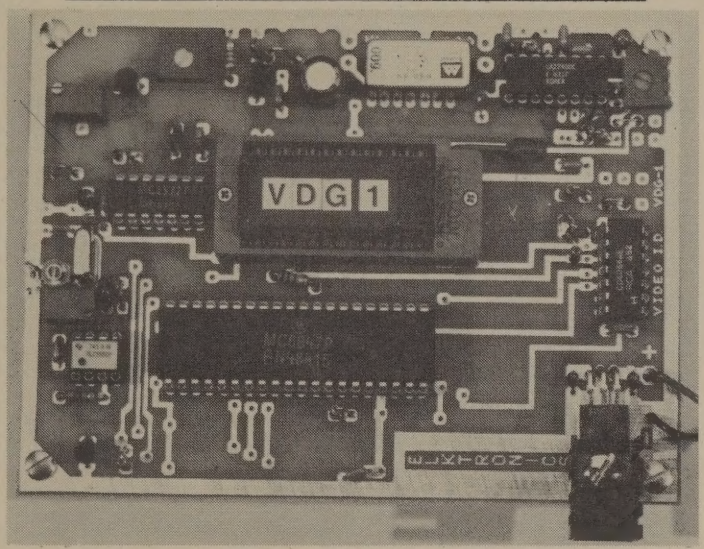

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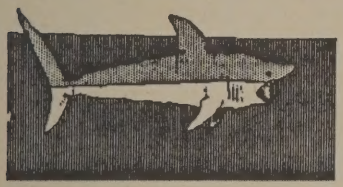

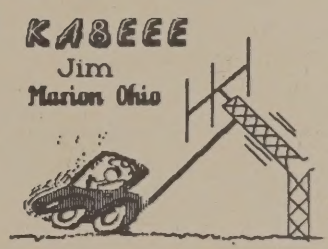

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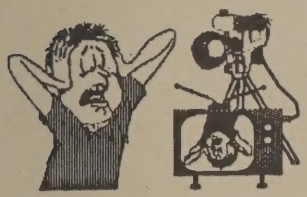

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- Instant Video Source
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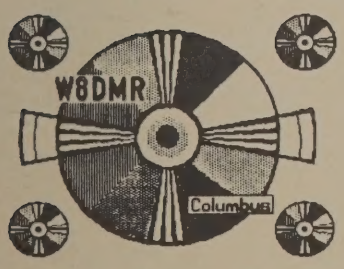

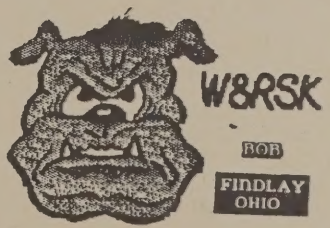

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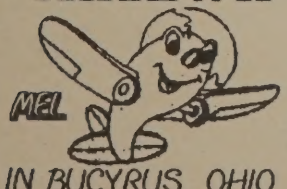

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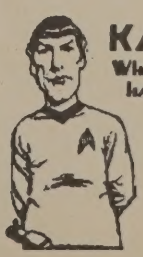

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TC70-10 Transceiver lets you get on right away with all the power most will need in one box - *90 Miles line of sight

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  Typical range from 2 to15 Watts allows proper adjustment to fully drive the RF Concepts 4-110 or Mirage D1010-ATVN to full 100 Watts output for DX, without sync or audio clipping.
- Separate mic and line audio volume controls
  Lets you do voice over commenting on video tapes
- Rugged 7.5x7.5x2.7" black die cast alum. box
  Stands up under rough public service applications and takes up less space on the operating table than 1 Watt plus amp.
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  lets you properly set the video gain control based on final output RF rather than low level. Camera video is at this jack during receive for focus & lighting set up before transmitting.

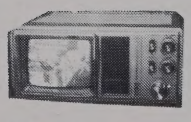
Front panel jacks accept composite video and line audio from your camcorder or VCR plus a low Z mic with push to look. Sensitive GaAsfet downconverter tunes whole 420-450 MHz 70cm band down to your TV channel 2, 3 or 4. Comes with one crystal you specify on 439.25, 434.0, 427.25 or 426.25. Second switch selectable crystal add $15. Requires 13.8 Vdc @ 3 Amps.

P.C. Electronic pioneered the ATV transceiver in 1977 with the 10 Watt TC-1. While the change in 1985 to the 1.5 Watt units gives the flexibility of selecting 15, 50 or 70 Watts depending on the situation, many long time ATVers said they missed the old 10 Watter which did just fine in most cases for local and repeater use - *90 miles snow free line of sight using 14 dBd beams. You've always been able to build your own 10 Watt system from some of the basic modules on page 2 (TVC-2G, TXA5-70, FMA5-F and PA5), but now we have a ready to go alternative in a rugged die cast aluminum box.

Transmitting equipment sold only to licensed Tech class radio amateurs, verified in the Callbook, for legal purposes. If newly licensed or upgraded, mail or fax copy of license. However, receiving downconverters available to all (pgs 4 and 5).

COMPLETE 70CM ATV STATION

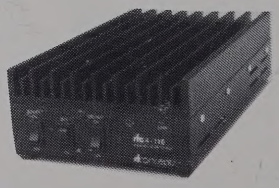
3/94



Your TV set

+

+



+

Your video camera or camcorder

TC70-10...$499
+ ATV Transceiver
10 Watts p.e.p. min.
13,8 Vdc @ 3A power supply req.
specify transmit frequency(s)

Optional 100 Watt Amplifiers
RF Concepts 4-110.....$349
Mirage D1010-ATVN ...$364
25 Amp pwr supply req.

Antennas - see pg 5
KLM 440-16X 14dBd $134
KLM 440-10X 11 dBd $74
KLM 440-6X 8.9 dBd $60
RUTLAND FO22-ATV 15.8 dBd $115

Remember when comparing prices, ours include UPS surface shipping.

HAMS, call, fax or write NOW for your free 10 page catalogue of our Quality ATV products!